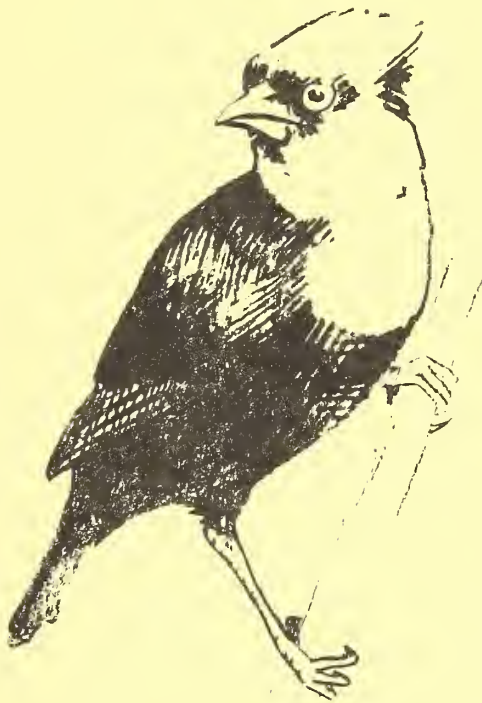


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MALIMBUS

Journal of the West African Ornithological Society

Société d'Ornithologie de l'Ouest Africain



VOLUME **4** 1982

Number 1, May

WEST AFRICAN ORNITHOLOGICAL SOCIETY

SOCIÉTÉ D'ORNITHOLOGIE DE L'OUEST AFRICAIN

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THE MOULT OF SOME BIRD SPECIES ON MOUNT CAMEROON*

by R. Eyckerman and D. Cuvelier

Received 23 March 1982

Revised 6 April 1982

Biological field work was carried out during a visit to the slopes of Mount Cameroon in February, March and April 1981 (Bosmans 1982). Systematic mist-netting at several localities from 22 February to 24 March resulted in the capture of 305 birds belonging to 64 species (Eyckerman & Cuvelier, in prep.). For some of these species large samples were caught and examined for moult. Moult data for African birds being scant, our data are presented here even if they are sometimes fragmentary.

Moult was assessed by scoring according to the numerical method used by Newton (1966). Each remex and rectrix feather was scored as 0 (old), 1 (missing, or small pin), 2 (one-third grown), 3 (half grown), 4 (three-quarters grown) and 5 (full-grown), and the moult score determined simply by summing the individual feathers scores.

VERREAUX'S TOURACO *Tauraco macrorhynchus verreauxii*

A male and a female with regressed gonads were shot at 1,900 m; both were in heavy moult:

	♂	Primaries	Secondaries	Tertials	Rectrices	
left	outer	0,0,0,0,2,5,5,5,5,5,	5,5,5,0,4,4,	5,5,5,5,	5,5,3,5,0,	inner
right		5,0,0,2,2,5,5,5,5,5,	5,5,5,0,5,5,	5,5,5,5,	0,5,5,0,1,	
	♀					
left		(damaged; moult not scored)			2,1,5,5,0,	
right		0,0,0,0,0,0,0,5,5,5,	5,5,5,5,5,2,	0,0,0,0,	0,5,5,5,5,	

The moult of the male agrees with Stresemann's (1966) findings: distal primaries start moulting when the proximal reaches P5. The secondaries of the male seem to follow a similar pattern with a proximal and distal group, but in the female there is no evidence for this. The tail moults very irregularly. Louette (1977) recorded remex moulting specimens of this species in the months February, July, October, November, December.

* Scientific results of the Belgian Mount Cameroon Expedition, February-April 1981: VI.

BROWN-BACKED CISTICOLA *Cisticola hunteri discolor*

This species has a complete postnuptial moult in March, April and May (Lynes 1930). We caught 18 individuals at 1,900 m in March; the presence of family parties and juveniles suggests that the breeding season ended shortly before. Of 13 adults ten were moulting, with primary scores between 14 and 55. This span was too small for assessing the relationship between primary, secondary, and tertial moult. Comparing primaries and rectrices, we find the relationship $y = 24.31 + 0.82 x$; i.e. tail moult starts when P3 is growing and has finished before P8 grows. Tail feathers seem thus to grow somewhat faster than primaries. Tail moult is irregular and many feathers are growing simultaneously:

Bird no.	T6	5	4	3	2	1	1	2	3	4	5	6
1	1	5	1	0	5	5	5	5	5	2	5	0
2	0	0	0	0	0	0	0	0	0	0	5	0
3	1	2	2	2	4	0	0	2	2	2	2	1
4	0	0	3	2	0	2	4	4	3	3	3	0
5	2	3	3	3	3	0	0	3	3	3	3	2
6	2	0	5	0	2	0	0	0	0	0	2	2
7	2	0	0	0	0	0	0	0	0	0	0	2
8	0	0	0	0	0	0	1	0	0	0	1	1
9	1	2	3	3	0	5	5	2	2	2	2	1
10	1	1	1	2	2	1	5	0	0	0	1	1

PREUSS'S DOUBLE-COLLARED SUNBIRD *Nectarinia preussi preussi*

Eight were captured at 1,900 m, all moulting. Five males had primary scores from 37 to 55 (mean 43) and three females from 24 to 44 (mean 34). Thus females may moult slightly later than males. The relation between primary and secondary moult in males was: $y = 34.79 + 0.85 x$. The first secondary remex is thus shed when P4 is growing, and secondary moult is completed when P9 is growing. For the relation between primaries and tertials we find: $y = 36.19 + 0.70 x$. Tertials seem to follow the sequence: middle (2), proximal (3), distal (1). The first (2) is shed when P4 is growing and the moult of the tertials is complete when P6 is growing. Only two birds were moulting tail feathers, and tail moult appears normally to be centrifugal. Rectrix 1 is thus dropped first and not last as Hanmer (1981) found in several species of *Nectarinia* in Moçambique and Malaŵi.

BLACK-CROWNED WAXBILL *Estrilda nonnula*

20 were caught at 1,200 m and seven at 1,900 m. Seven were moulting flight feathers and one was in contour moult. For six birds we calculated the relationship between primary and secondary moult to be: $y = 44.68 + 1.08 x$; i.e. secondary moult starts when P5 is growing and lasts somewhat longer than primary moult.

BRONZE MANNIKIN *Lonchura cucullata cucullata*

Bronze mannikins were very common around the camp site at 1,200 m and 24 were caught, mainly juveniles. All except one were moulting. In juveniles, primary and secondary moult are related by the equation: $y = 34.22 + 1.27x$ ($n = 15$), which means that the secondary remiges moult starts when P4 is growing and continues some time after primary moult is completed. Secondary remiges thus appear to grow at a slower rate.

Woodall (1975) described moult in Zimbabwe. Post-juvenile and post-nuptial moult is complete and he found no differences between the two moulting patterns. He found that secondaries only started to moult with P6, P7 or P8, considerably later than in our population. Also, in Zimbabwe, secondary moult extends beyond the primary moult period. Tertiary moult follows the pattern: middle (2), proximal (3), distal (1) in contrast with Woodall's sequence from distal to proximal (1, 2, 3). The relationship with primary moult is: $y = 31.77 + 1.40x$ ($n = 4$). The first tertiary is thus dropping when P4 is growing and continues until P8 is growing. This is in agreement with Woodall's findings. Many individuals had new feathers in their tails but only five were actively moulting rectrices ($y = 58.2 + 0.23x$). Tail moult would thus take place between the P6 and P8, which is also later than Woodall found in his population where tail moult started with or before primary moult.

YELLOW BISHOP *Euplectes capensis phoenicomerus*

Nine were caught at 2,800 m of which eight were moulting flight feathers. We derived the following equation: primaries - secondaries $y = 88.84 + 0.56x$ ($n = 7$); primaries - tertiaries $y = 69.30 + 0.75x$ ($n = 5$); primaries - tail $y = 60.80 + 0.77x$ ($n = 8$). Moult of secondary remiges as well as tertiaries and tail start while P7 is growing. They all end at about the same time as primary moult.

ACKNOWLEDGEMENTS

The expedition was supported by grants of the Belgian National Science Foundation and the King Leopold III foundation for exploration and conservation of Nature. We wish to thank the Cameroonian authorities for their kind cooperation, especially Dr. E. Tebong, director of the Institute of Animal Research at the General Delegation for Scientific and Technical Research. We wish to thank Prof. Dr. J. Hublé, Prof. Dr. A. Dhondt and Dr. M. Louette for reading the manuscript and helpful criticism.

SUMMARY

Moult data are discussed for *Tauraco macrorhynchus*, *Cisticola hunteri*, *Nectarinia preussi*, *Estrilda nonnula*, *Lonchura cucullata* and *Euplectes capensis*.

REFERENCES

- BOSMANS, R. (in prep.) Scientific results of the Belgian Mount Cameroon Expedition (February-April 1981). Situation of the collecting sites on the altitudinal zonation. Description of *Hahnia leopoldi* n.sp. (Araneae: Hahnidae). *Rev. Zool. Afr.*
- EYCKERMAN, R. & CUVELIER, D. (in prep.) Scientific results of the Belgian Mount Cameroon Expedition (February-April 1981) IV: Birds. *Rev. Zool. Afr.*
- HANMER, D.B. (1981) Mensural and moult data of nine species of sunbird from Moçambique and Malaŵi. *Ostrich* 52: 156-158
- LOUETTE, M. (1977) De avifauna van Kameroen en haar Zoögeografische interpretatie (Partim Non-Passeriformes). Unpubl. Ph.D. Thesis, pp. 384
- LYNES, H. (1930) Review of the genus *Cisticola*: *Ibis* suppl.: 1-673
- NEWTON, I.R. (1966) The moult of the Bullfinch *Pyrrhula pyrrhula*. *Ibis* 108: 41-67
- STRESEMANN, E. & STRESEMANN, U. (1966) Die Mauser der Vögel. *J. Orn.* 107: 1-448
- WOODALL, P.F. (1975) The life history of the Bronze Mannikin. *Ostrich* 46: 55-86

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REMARQUES A PROPOS DES BUSES (*Buteo buteo* ssp.)
OBSERVEES EN AFRIQUE OCCIDENTALE

par René de Naurois

Received 12 October 1981

Morel & Browne (1981) ont énuméré les observations et captures de buses faites par divers auteurs et par eux-mêmes en Mauritanie, au Sénégal, au Libéria et au Ghana. En dehors de plusieurs mentions relatives à *Buteo rufinus*, ils relatent la douzaine de cas suivants: une capture dans le Sud Mauritanien, l'oiseau ayant été identifié comme *Buteo b. buteo*; quatre notations dans le Sud-Ouest Mauritanien et le Nord-Ouest Sénégalais, portant sur six sujets, *Buteo buteo* ssp, sans qu'il ait été possible de préciser la sous-espèce ni l'origine; une capture au Libéria, le spécimen ayant été rapporté (Forbes-Watson) à la forme *intermedius* (non reconnue par Vaurie 1961) qui représente une transition entre *Buteo b. buteo* et *Buteo b. vulpinus*, faites en Mauritanie, au Sénégal et au Ghana. Ces données appellent quelques commentaires. Je les présenterai sous forme de suggestions et d'hypothèses.

Une possibilité semble n'avoir pas été envisagée jusqu'à ce jour. C'est que s'aventurent en Afrique Occidentale des Buses originaires de l'Archipel du Cap-Vert ou, à la rigueur, des Iles Canaries, de Madère, ou des Açores. Dans le présent travail, je ne discuterai que la première de ces éventualités, la moins improbable: celle d'apparitions sur le continent africain, de ces Buses cap-verdiennes auxquelles Swann (au vu d'un seul specimen!) donna le nom de *bannermami*.

Leur présence occasionnelle ne peut être qu'un événement rare. D'abord en raison de la distance qui sépare l'archipel de la côte continentale: 5 à 600 km selon les îles! Mais aussi parce que les populations de *Buteo buteo*, dans les diverses îles où elles sont reproductrices, sont fort réduites: en très petit nombre à l'Ile de Fogo, mais jamais vue à Brava toute voisine; quelques sujets, anciennement, à Boa Vista, mais aucun à Sal; quelques couples à S. Nicolau, mais rien sur les îlots Raso et Branco, ni à l'île de Santa Luzia; quelques paires peut-être à S. Vicente, sans certitude; et une population résidente à S. Antão, dont l'importance n'a pas pu être estimée correctement. C'est seulement à Santiago (près de 1,000 km²) que le contingent est sûrement substantiel. Au terme de recherches poursuivies au cours de nombreux séjours (de 1963 à 1968) j'évaluais à moins de 100 oiseaux le nombre total - un nombre qui s'avérera sans doute plus élevé si l'île de S. Antão, avec ses 780 km², porte une population plus nombreuse qu'il ne m'est apparu au cours des prospections (Naurois 1968).

NDLR: nous avons respecté la décision de l'auteur qui, estimant la systématique des Passereaux plus difficile que celle des Non-Passereaux, a tenu à préciser la sous-espèce.

A ces deux causes immédiate - éloignement et faiblesse des effectifs - s'ajoute une raison plus générale: l'humeur sédentaire, bien connue, des oiseaux insulaires. Il ne s'ensuit pas qu'aucun facteur ne puisse jouer en sens inverse: dans le sens d'incursions de Buses capverdiennes vers l'Afrique continentale.

Ce qui vient donner quelque appui à l'hypothèse ce sont trois ordres de faits qui ne sont pas totalement indépendants les uns des autres: la rigueur des conditions climatologiques et écologiques dans l'archipel, les compétitions, les va-et-vient probables ou effectivement constatés.

Le climat capverdien est caractérisé non seulement par l'aridité mais aussi par l'extrême irrégularité des précipitations. Plusieurs années de sécheresse peuvent se succéder (jusqu'à 3, 4, ou 5 années), entraînant des disettes ou famines pour les humains, limitant de façon brutale les nombres d'espèces végétales et animales, obligeant les oiseaux de basse altitude (Alaudidae surtout) à transhumer du Nord ou du Nord-Ouest vers le Sud, en quête de conditions moins défavorables, obligeant même, dans certains cas, à des déplacements vers le continent (je reviendrai sur ce dernier point).

On conçoit que de telles conditions puissent aggraver des compétitions qui, normalement, resteraient d'ordre potentiel. En voici un cas, qui nous intéresse directement. Il existe dans l'Archipel quatre espèces de Falconiformes: *Falco peregrinus madens* très rare, *F. tinnunculus* très abondant, *Milvus m. migrans* abondant, *Milvus (milvus) fasciicauda* assez commun et *Buteo buteo bannermani*. S'il n'y a pas compétition effective entre le Pèlerin et les quatre autres, il existe sûrement deux conflits latents: entre le Milan Noir et le Milan endémique; mais aussi entre le Milan Noir et la Buse.... Il y a cent ans *Milvus fasciicauda*, occupait toutes les îles. Sur près de 10 spécimens de Milans capverdiens, collectés par Boyd Alexander à la fin du siècle dernier, deux seulement sont des Milans noirs (collections du British Museum). L'invasion (ou-ré-invasion) récente par le *M. migrans* a eu pour effet de repousser *fasciicauda* vers les îles du nord et du nord-ouest (S. Nicolau et S. Antão). Quant à la Buse le moins qu'on puisse dire est que sa situation est précaire. Le Milan l'a exclue presque partout des altitudes basses (100 à 300 m) et l'a refoulée vers l'amont de certaines vallées, audessus de 4 ou 500 m. D'une manière générale, l'éventail des proies disponibles est toujours plus réduit dans les îles que sur les continents. Mais ici, en s'appropriant les fonctions de voirie, le Milan a enlevé à la Buse une partie des ressources qui faisaient encore partie de son régime à une époque récente. Le résultat est que *bannermani* semble raser les ... parois rocheuses, occupe une position marginale et fait figure d'expulsée dans son propre pays. Il n'est pas absurde de supposer qu'elle puisse parfois chercher à s'évader ...

De façon plus générale on constate chez plusieurs autres espèces des arrivées récentes en provenance du continent, mais aussi des va-et-vient plus ou moins irréguliers. Divers Ardeidae (*Egretta gularis*, *E. ardesiaca*) et Plataleidae apparaissent à Santiago mais ne s'y fixent pas (Naurois 1964). *Bubulcus ibis* a envahi les îles depuis plusieurs décennies, mais sa reproduction, après plus de cent ans de recherches, n'a été découverte qu'à un seul endroit (S. Domingos, Ile de Santiago) en 1965 (v. Bannerman 1969). Encore ne s'agit-il en ce lieu que de deux ou trois couples (Naurois 1968)! Où donc nichent les bandes de Garde-Boeufs que l'on rencontre sur un bon tiers des îles? Viendraient-elles d'Afrique, et y retourneraient-elles? Ce n'est pas tout. L'arrivée d'*Himantopus himantopus* comme nicheur à l'île de Sal est toute récente. Mais surtout, cas plus sug-

gestif, *Gallinula chloropus* est absente de ses lieux de reproduction (à Boa Vista et Santiago) pendant les séries d'années sèches: sans doute repart-elle en direction de l'Afrique continentale, sauf à revenir dans l'archipel après que les pluies ont rempli à nouveau les lagunes côtières (Naurois 1969). Un dernier exemple est peut-être fourni par *Milvus m. migrans* lui-même. En effet sa population sur les îles ne paraît pas être stable. Il est, certes, nicheur dans plusieurs îles (Naurois 1970) mais il semble que ses effectifs varient en cours d'année: comme si des migrateurs se déplaçaient non plus du Sénégal vers la Berbérie et l'Europe (migration "classique" de *M. m. migrans*) mais du Sénégal vers l'archipel capverdien; comme si certains contingents ayant eu l'occasion de faire escale sur les îles, avaient décidé de les adopter en lieu et place de destinations plus septentrionales - et ceci en nombres variables d'une année à l'autre. Seuls des baguages nous fixeront.

Bref, *Buteo buteo bannermani*, quoique résidente, voire endémique (faiblement comme je vais le montrer), pourrait s'aventurer sur le continent: rarement sans doute, et non sans risques, mais peut-être moins rarement que son indolence toute insulaire ne le laisserait supposer.

Le problème posé au départ - identité et origine des Buses collectées en Afrique Occidentale (Continentale!) - sera de toute façon difficile à résoudre. Il faudrait en effet que les examens (ou ré-examens) comparatifs incluent des spécimens authentiquement capverdiens. Mais existe-t-il des caractères distinctifs pour la Buse de ces îles? Vaurie ne put examiner qu'un spécimen et se refusa à conclure (1953). N'ayant eu en mains que trois adultes et deux immatures, j'ai moi-même réservé mon jugement (1972). La Buse insulaire est sans doute un peu plus petite que les Buses d'Europe; elle semble surtout avoir une queue plus courte. Mais ces caractères, impossibles à apprécier avec certitude sur des oiseaux en vol (*in natura*) ne pourront pas être proposés comme tests avant qu'une plus longue série de specimens soit à disposition. La même réserve s'impose, autant sinon plus, en ce qui concerne les colorations. Flancs et culottes sont assez rouges chez *bannermani* (moins rouges, semble-t-il, que chez les Buses de Socotra); mais le reste du plumage ne présente de couleur rouille que chez les sujets jeunes. Je croyais avoir noté sur les parties supérieures une teinte originale: non pas franchement brune et foncée (comme chez les buses européennes) mais d'un brun plutôt clair et *lave de verdâtre* (ou de *sepia*). Il n'est pas certain que cette différence, qui me frappa sur des plumages frais, se conserve en collection; de fait je ne la retrouve pas ... Reste le pattern des poitrines et abdomens. Chez les sujets que j'ai pu observer à courte distance, les parties blanches étaient inégalement étendues (il n'existe pas de *phase* blanche!); et tous les adultes présentaient des *barres* brunes, plutôt rouge-brun, étroites et serrées, sur les côtés et le bas du ventre (la Buse de Socotra est plus rouge; Frost et Sigfried 1970). C'est tout, et c'est trop peu.

Nous nous retrouvons ainsi, avec cette Buse des Iles du Cap-Vert, en proie à des perplexités analogues à celles que nous cause, à l'autre bord de l'Afrique, la Buse de l'Ile de Socotra (Frost et Siegfried 1970). Et pour cause si, comme je le pense, il s'agit à l'extrême Est comme à l'extrême Ouest, de populations *relictas*, issues d'ancêtres d'origine paléarctique (et non éthiopienne comme *Buteo oreophilus*), qui se seraient établies en zone inter-tropicale à quelque époque "humide" du Quaternaire récent, peut-être pas plus anciennement qu'à l'"optimum climatique" (il y a 6 ou 8,000 ans). Dans le vaste espace intermédiaire (Sahara) une évolution plus rapide aurait produit *Buteo rufinus*. Aux deux extrémités,

les populations insulaires, bénéficiant de l'effet modérateur des climats océaniques, auraient divergé moins vite. Elles auraient même pu acquérir, par convergence, quelques traits communs. Rien de tout cela ne vient faciliter nos diagnostics touchant des *Buteo buteo* erratiques au Sahel et en zone soudano-guinéenne!

Ni mes recherches passées ni mes spéculations présentes n'eussent été possibles si je n'avais reçu la généreuse hospitalité des Muséums de New York, de Tring et de Paris, et si je n'avais été aidé de toutes manières par MM les Gouvernements et Administrateurs de l'Archipelago de Cabo Verde ainsi que par mes nombreux amis des îles. Je leur exprime ici ma gratitude.

SUMMARY

Some tropical bird species visit the Cape Verde Archipelago without settling there. Others have successfully colonized the islands only recently; or breed there sparsely and irregularly because desertic conditions and prolonged droughts make life difficult. It suggests that *Buteo buteo*, a rather rare inhabitant of some islands, handicapped by the invasion of the Black Kite, may perhaps leave them at times and wander to adjacent parts of Africa.

REFERENCES

- FROST, P.G.H. & SIEGFRIED, W.R. (1970) Notes on the plumage of buzzards from Socotra. *Bull. Br. Orn. Cl.* 90: 136-142
- MOREL, G.J. & BROWNE, P.W.P. (1981) Les *Buteo* paléarctiques en Mauritanie et au Sénégal. *Malimbus* 3: 2-6
- NAUROIS, R. de (1965) Faits nouveaux concernant le peuplement avien de l'Archipel du Cap-Vert. *C. R. Ac. Sc. Paris* 260: 5911-5914
- NAUROIS, R. de (1969) Notes brèves sur l'avifaune de l'archipel du Cap-Vert. *Bull. I.F.A.N.* 31 (Sér. A), 1: 143-218
- NAUROIS, R. de (1969) Problèmes concernant la Poule d'eau (*Gallinula chloropus* L.) de l'Archipel du Cap-Vert. *Bol. Soc. Port. Ciencias Naturais* 2e sér., 12: 141-154
- NAUROIS, R. de (1973) Recherches sur la Buse (*Buteo buteo* L.) de l'Archipel du Cap Vert. Vol. d'hommage au Prof. Fernando Frade. Lisbonne.
- NAUROIS, R. de (1972) The kites of the Cape Verde Islands (*Milvus milvus fasciicauda* and *Milvus m. migrans*) and a hypothesis about speciation and geographical distribution in the genus *Milvus*. *Proc. XV Int. Orn. Congr.* (The Hague, De Hagen 1970): 671-673
- VAURIE, C. (1961) Systematic notes on palearctic birds. No. 47. Accipitridae: the genus *Buteo*. *Amer. Mus. Nat. Hist.* 2042

COMPORTEMENT, VOIX ET RELATIONS DE PARENTE DE L'AMARANTHE
DU MALI (*Lagonosticta virata*)

par J. Nicolai

Received 12 March 1982

Dans sa "Liste commentée des oiseaux du Mali", Lamarche (1981) mentionne une espèce d'Estrildidé qui, de par sa répartition géographique et ses exigences écologiques, occupe une place spéciale dans la famille des Estrildidés. Aucun autre Estrildidé africain n'a une aire de répartition contenue tout entière à l'intérieur des frontières politiques d'un seul pays. Seule cette forme peu connue de *Lagonosticta* est limitée dans sa répartition aux massifs gréseux du Mali, à l'Est de Mopti, en passant par Koulikoro jusqu'aux Monts Mandingues.

Pour la couleur du plumage, c'est à la sous espèce *polionota* de *Lagonosticta rubricata* que *virata* ressemble le plus. Cependant le dessus de la tête, la nuque et le dos sont gris ardoisé pur et non pas nuancé de rouge, comme chez *polionota*. Les joues, la gorge et le ventre sont rouge brique chez *virata* et non rouge sombre comme chez *polionota*. La femelle ne se distingue du mâle que par la coloration plus pâle du ventre. Cette ressemblance avec *polionota* a conduit la plupart des auteurs à considérer cet Estrildidé comme une sous espèce de *Lagonosticta rubricata*.

Une caractéristique commune à toutes les sous espèces de *Lagonosticta rubricata* est un rétrécissement des barbes intérieures de la 8^{ème} rémige primaire, ce qui la différencie nettement de ses voisines quand l'aile est déployée. Chez *virata*, par contre, la 8^{ème} rémige primaire n'est pas rétrécie et la largeur de ses barbes intérieures est la même que pour les autres rémiges primaires. Ce fait a conduit White (1963) à considérer l'Amaranthe du Mali comme une sous espèce de *Lagonosticta rhodopareia**, qui elle non plus ne présente pas de rétrécissement de la 8^{ème} rémige primaire.

De proches relations de parenté entre *rhodopareia* et *virata* sont cependant extrêmement invraisemblables, ne serait ce qu'à cause de leurs répartitions géographiques respectives. *Lagonosticta rhodopareia* est un Estrildidé dont la principale zone de répartition se trouve en Afrique orientale, de l'Erythrée en direction du Sud jusqu'en pays zoulou. Elle est représentée en Afrique occidentale par la sous espèce *ansorgei*, distribuée de l'embouchure du Congo en direction du Sud jusqu'au Kunéné. Environ 3,000 km à vol d'oiseau séparent la frontière la plus méridionale de l'aire de répartition de *virata* du point le plus rapproché de la limite nord de répartition de *Lagonosticta rhodopareia ansorgei*. Par voie de terre, ce sont 3,500 km qui séparent les lieux de reproduction les plus rapprochés de ces deux Estrildidés.

* *jamesoni* est seulement une sous espèce de *L. rhodopareia* (Wolters, 1963).

Outre ces arguments géographiques, *virata* et *rhodopareia* sont dans leur coloration et leur voix si différentes qu'une proche parenté est à exclure. Le fait que les barbes intérieures de la 8^{ème} rémige primaire ne soient pas rétrécies est certainement le signe d'une adaptation écologique, à interpréter comme une adaptation à un même genre de vie dans un milieu relativement ouvert et offrant peu de protection (Wolters, 1965). Le groupement de *virata* avec les sous espèces de *Lagonosticta rhodopareia*, entreprise par White sur le seul critère de la forme de la 8^{ème} rémige primaire, ne trouve aucune justification dans les autres caractéristiques morphologiques et surtout ethologiques.

Dans le cadre de recherches sur le comportement de parasitisme chez les veuves, Viduidae, (Nicolai 1964, 1969, 1972), j'ai élevé en captivité entre autres toutes les espèces du genre *Lagonosticta*. L'élevage jusqu'à l'émancipation des jeunes réussit chez *Lagonosticta senegala*, *L. rubricata*, *L. nitidula*, *L. rufopicta*, *L. rara* et *L. vinacea*. Des enregistrements des appels et chants existent pour toutes les espèces ainsi que les sous espèces *rhodopareia* et *jamesoni* de *Lagonosticta rhodopareia* et *polionota*, *haematocephala*, *ugandae*, *congica* et *landanae* de *Lagonosticta rubricata*.

J'ai pu me livrer à des observations sur la vie en liberté et la biologie de la reproduction dans les pays africains suivants: Kénia (*L. senegala*, *L. rhodopareia*, *L. rara*); Tanzanie (*L. senegala*, *L. rhodopareia*, *L. rubricata*); Ouganda (*L. senegala*, *L. rufopicta*, *L. rara*); Cameroun (*L. rara*, *L. rubricata*); Nigéria (*L. senegala*, *L. rufopicta*, *L. rubricata*, *L. rara*, *L. vinacea*); Mali (*L. senegala*, *L. virata*).

J'ai consacré un voyage de deux semaines au Mali (14.-28 août 1976) uniquement à des recherches sur l'Amaranthe du Mali. J'ai trouvé ces oiseaux, en parcourant la région entre Bamako et Koulikoro, sur chaque massif gréseux de quelque importance. Dès ma première rencontre avec l'Amaranthe du Mali, je remarquai que ces oiseaux se montrent beaucoup plus à découvert que ceux des sous espèces que je connais de *Lagonosticta rubricata*. Ils étaient perchés, souvent par paires ou en petits groupes, sur de gros morceaux de rochers et fuyaient à mon approche non pas en un vol court vers le buisson le plus proche comme *Lagonosticta rubricata*, mais volaient adroitement sur de longues distances en remontant la pente. Ce comportement différent de celui de *rubricata* est pourtant certainement une adaptation à un biotope plus ouvert, plus dépourvu de protection et autorise par là aussi peu de conclusions en ce qui concerne la systématique que la forme de la 8^{ème} rémige primaire.

Les vocalisations de *rubricata* et *virata* sont cependant très différentes. Les mâles de *rubricata* ont un chant, qui change un peu de sous espèce à sous espèce, mais qui consiste toujours en un nombre de strophes, composées selon le cas de 3 à 6 éléments identiques qui se succèdent. Selon la structure des éléments, les strophes rappellent par leurs résonnances certaines strophes de l'Alouette lulu (*Lullula arborea*), du Pipit des arbres (*Anthus trivialis*) ou du Rossignol philomèle (*Luscinia megarhynchos*).

Le chant est plus souvent introduit par une séquence de sons croissants très légers, rappelant un peu les combinaisons de sons rauques dans le chant du Bouvreuil (*Pyrrhula pyrrhula*). Elle est souvent répétée pendant plusieurs minutes à intervalles de 4 à 8 secondes, avant que l'oiseau se décide à passer à ses strophes sonores et peut aussi se faire entendre pendant le chant lui-même. Les trilles, qui jouent le rôle



Figure 1 Biotope de *Lagonosticta virata*. Massifs gréseux près de Bamako,
Mali

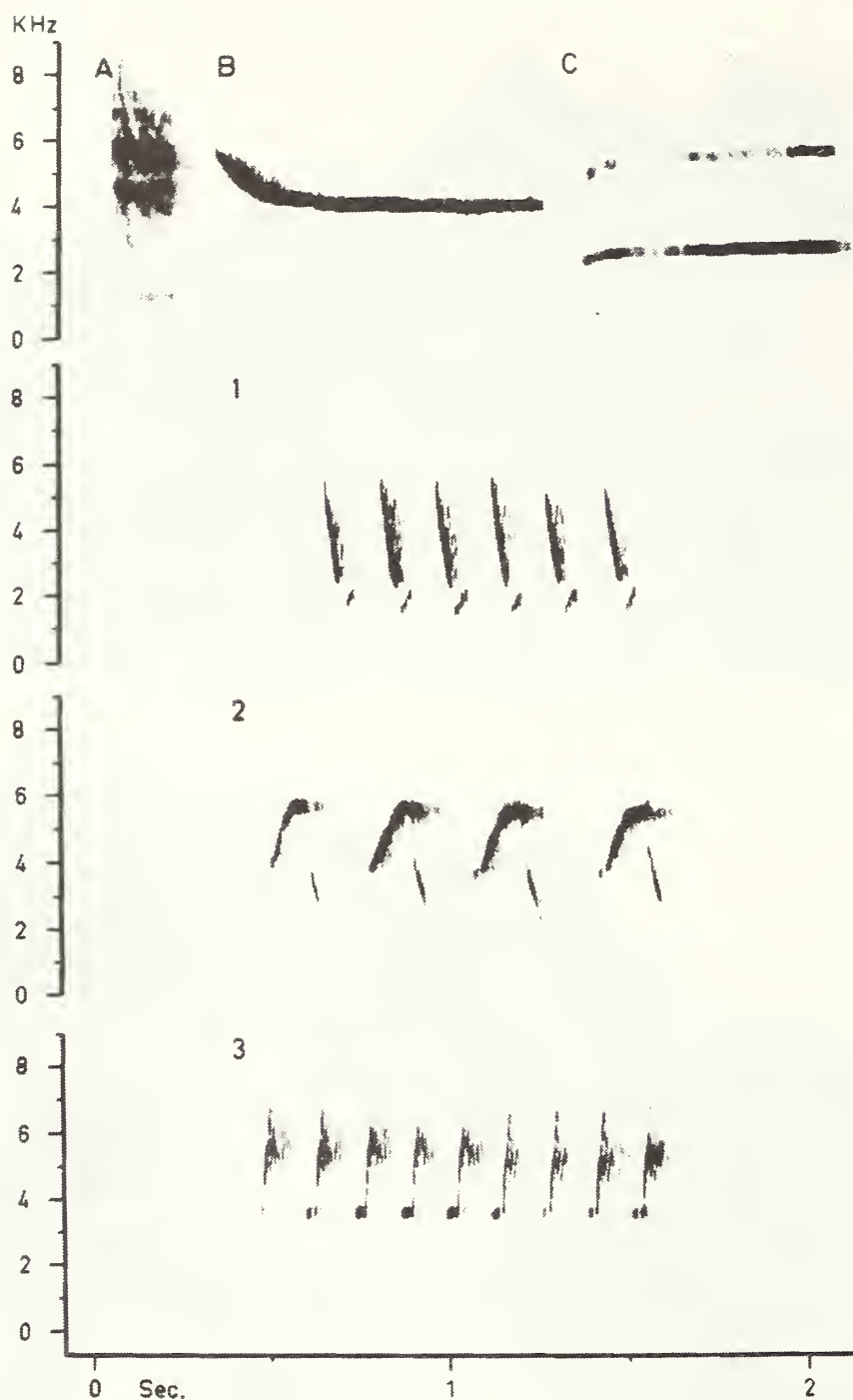


Figure 2 Les motifs du chant de *Lagonosticta virata* (A, B, C) et strophes typiques des chants de *Lagonosticta rubricata haematocephala* (1), *Lagonosticta rubricata congica* (2), *Lagonosticta rubricata landanae* (3)

principale dans le chant de *Lagonosticta rhodopareia*, n'apparaissent chez *rubricata* que très brièvement et rarement et sont d'importance secondaire pour la composition du chant. L'impression générale que donne le chant de *rubricata* est déterminée par la nette division en strophes, séparées par des pauses relativement longues.

Le chant de *virata* est par contre organisé de façon toute différente. Il est réduit à l'extrême et consiste principalement en trois motifs, dont chacun comporte un seul élément. Le premier de ces motifs (motif A) est un son court rappelant l'appel de contact du Diamant Mandarin (*Taeniopygia guttata*) ou du Bouvreuil githagine (*Bucanetes githagineus*), répété à intervalles de 3 à 6 secondes pendant plusieurs minutes. Ce n'est que très occasionnellement que le chanteur exécute ce motif A dans une succession plus rapide, 3 à 5 fois de suite, de sorte que l'ébauche d'une formation de strophe apparaît. Le second motif (B), moins fréquent, est un sifflement aigu allongé qui commence à 5 kHz, tombe rapidement à 3,5 kHz et qui se prolonge à ce niveau d'intensité. Ce motif se fait entendre aussi de façon isolée, répété sans cesse à des intervalles variant entre 5 et 13 secondes. Le dernier motif (C) est relativement rare. C'est un sifflement, que ses fréquences supérieures rendent doux, d'une intensité de 2,5 kHz et plus bref que le motif B.

Un mâle commence normalement son chant par une suite de motifs A pendant plusieurs minutes, passe ensuite au motif B et introduit à la fin de ce chant simple quelques motifs C isolés au milieu des motifs B qu'il continue d'exécuter. Dans une exécution de 12 minutes, le mâle chanta 38 motifs A successifs, interrompus par 2 motifs B, passa ensuite au motif B qu'il répéta 25 fois et n'interrompit par 4 motifs C isolés qu'à la fin de son exécution.

La différence la plus frappante entre le chant de *virata* et les chants des sous espèces de *L. rubricata* est, outre la pauvreté des motifs chez *virata*, l'absence totale chez celle ci d'une formation de strophes. De par la succession interminable de motifs identiques à intervalles relativement longs, le chant de l'Amarante du Mali donne une impression d'extraordinaire monotonie.

Les différences de chant sont très répandues parmi les sous espèces d'Estrildidés africains, et leur simple inventaire ne suffit pas à établir des conclusions systématiques importantes. Si pourtant ces différences atteignent une telle importance comme dans le cas décrit ci dessus, il est douteux que s'établissent entre leurs représentants des relations sociales et sexuelles, quand ils se rencontrent dans les zones de contact de leurs aires de distribution. On ne sait si l'Amarante du Mali, à un endroit de son aire de distribution, entre en contact avec *Lagonosticta rubricata polionota*: je suis en conséquence dépendant d'observations sur des oiseaux captifs pour l'exploitation des différences de chant entre *virata* et *rubricata*. Un mâle *virata*, en bonne santé et parfaitement adulte, vécut dans une de mes grandes volières pendant plusieurs mois avec quelques mâles et femelles des sous espèces *haematocephala* et *ugandae* de *L. rubricata*, sans se lier à eux. Par contre, des individus des sous espèces *haematocephala*, *ugandae*, *congica* et *landanae*, faute de compagnes et dans les mêmes conditions, s'associaient à peu près immédiatement à des représentants d'autres sous espèces. Leurs vocalisations différentes semblent constituer entre *virata* et *rubricata* une barrière sociale infranchissable qui, chez les très sociaux Estrildidés, a toujours pour suite une isolation sexuelle totale.

C'est à la sous espèce *polionota* de *L. rubricata*, sa voisine la plus proche géographiquement, que *virata* ressemble le plus en ce qui concerne les caractéristiques de coloration. Depuis la colonisation des massifs gréseux du Mali, situés plus au Nord, elle s'est pourtant éloignée de *polionota*, tant géographiquement et ethologiquement qu'en ce qui concerne la voix, de sorte que l'échange de gènes entre ces deux formes est depuis longtemps interrompu. En conséquence, je propose de reconnaître le statut d'espèce distincte à l'Amaranthe du Mali (*Lagonosticta virata*).

SUMMARY

Observations on the behaviour and vocalisations of the Mali Firefinch *Lagonosticta virata*, restricted to rocky outcrops of Mali, show that it is not a subspecies of *Lagonosticta rhodopareia*, as previously proposed, but a relative of the Dark Firefinch (*Lagonosticta rubricata*). The non-attenuated 8th primary (as it is in *L. rubricata*) is an adaptation to life in an open rocky habitat. The extreme differences in the vocalisations of *L. virata* and the subspecies of *L. rubricata*, and the laboratory observation that a single *L. virata* individual was unable to make social contact with individuals of the subspecies of *L. rubricata*, suggest that the Mali Firefinch is an independent species, ethologically separated from *L. rubricata* for a long time.

BIBLIOGRAPHIE

- LAMARCHE, B. (1981) Liste commentée des oiseaux du Mali. Part II.
Malimbus 3: 73-102
- NICOLAI, J. (1964) Der Brutparasitismus der Viduinae als ethologisches Problem. *Z. Tierpsychol.* 21: 129-204
- NICOLAI, J. (1969) Beobachtungen an Paradieswitwen (*Steganura paradisaea* L., *Steganura obtusa* Chapin) und der Strohvitwe (*Tetraenura fischeri* Reichenow) in Ostafrika. *J. Orn.* 110: 421-447
- NICOLAI, J. (1972) Zwei neue *Hypochera*-Arten aus West-Afrika. *J. Orn.* 113: 229-240
- WHITE, C.M.N. (1963) Notes on African Estrildinae. *Bull. Brit. Orn. Cl.* 83: 25-29
- WOLTERS, H.E. (1963) What is *Lagonosticta rhodopareia* Heuglin, 1968? *Ostrich* 34: 177-178
- WOLTERS, H.E. dans IMMELMANN, NICOLAI, STEINBACHER, WOLTERS. *Vögel in Käfig und Voliere. Prachtfinken, Part I.* H. Limberg, Aachen (1965 ff)

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ENVIRONMENTAL CHANGES IN WESTERN DARFUR, SUDAN, OVER HALF A CENTURY AND
THEIR EFFECTS ON SELECTED BIRD SPECIES

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Received 22 December 1981

Revised 14 April 1982

INTRODUCTION

It is almost 60 years since Capt. (later Admiral) H. Lynes, accompanied by C. McConnel in 1920 and by W. Lowe in 1921-22, studied the avifauna of Darfur. His intention was to remove the blank "as far as natural history is concerned ... constituted by Darfur and western Kordofan" and he did it splendidly. His basic ornithological studies in *Ibis* (Lynes 1924-25) remain the only major work on the birds of Darfur, and in addition his visits resulted in important contributions in botany, mammalogy and geology.

Information on the bird life of Darfur prior to Lynes' visit was very scant, generally unscientific and scattered in a variety of books of travel and memoirs in various languages; a brief review was given by Lynes (1924). Three subsequent papers (Madden 1934, 1935, 1946) and some scattered references in official reports represent the total new information, with some earlier results of the present study (Wilson 1976, 1981; Wilson & Ball 1979).

I spent two 18-month periods in Darfur; from 1972 to 1974 and from 1976 to 1977, working on livestock and range resource surveys throughout much of southern Darfur province. Its environment was described by Lynes (1924) in some detail. The first part of the present paper details some of the inevitable environmental changes in the intervening period.

CLIMATE

Few firm rainfall data are available for Darfur although a general climatic description is given in Wickens (1977). Nicholson (1978) suggested there were 'wet periods' from 1875 to about 1910 in the southern Sahara and Sahel zones (Fig. 1) and that 1910-1920 was 'dry', even with a 'severe drought'. He postulated that rainfall increased from 1920 to culminate in a 'wet' period in the 1950s, which was followed by a severe dry period from 1968 to 1973.

An analysis of rainfall at four stations with long run data (Table 1) supports Nicholson's conclusions. Running means for five stations in western Darfur all exhibit a generally high level of rainfall in the 1950s with a marked fall in the average in the 1960s and 1970s (Figure 2).

The general reduction in rainfall, undoubtedly accompanied by reduced cloud cover, greater solar radiation, and higher wet season temperatures has produced a more arid landscape, reflected in the hydrology and vegetation.

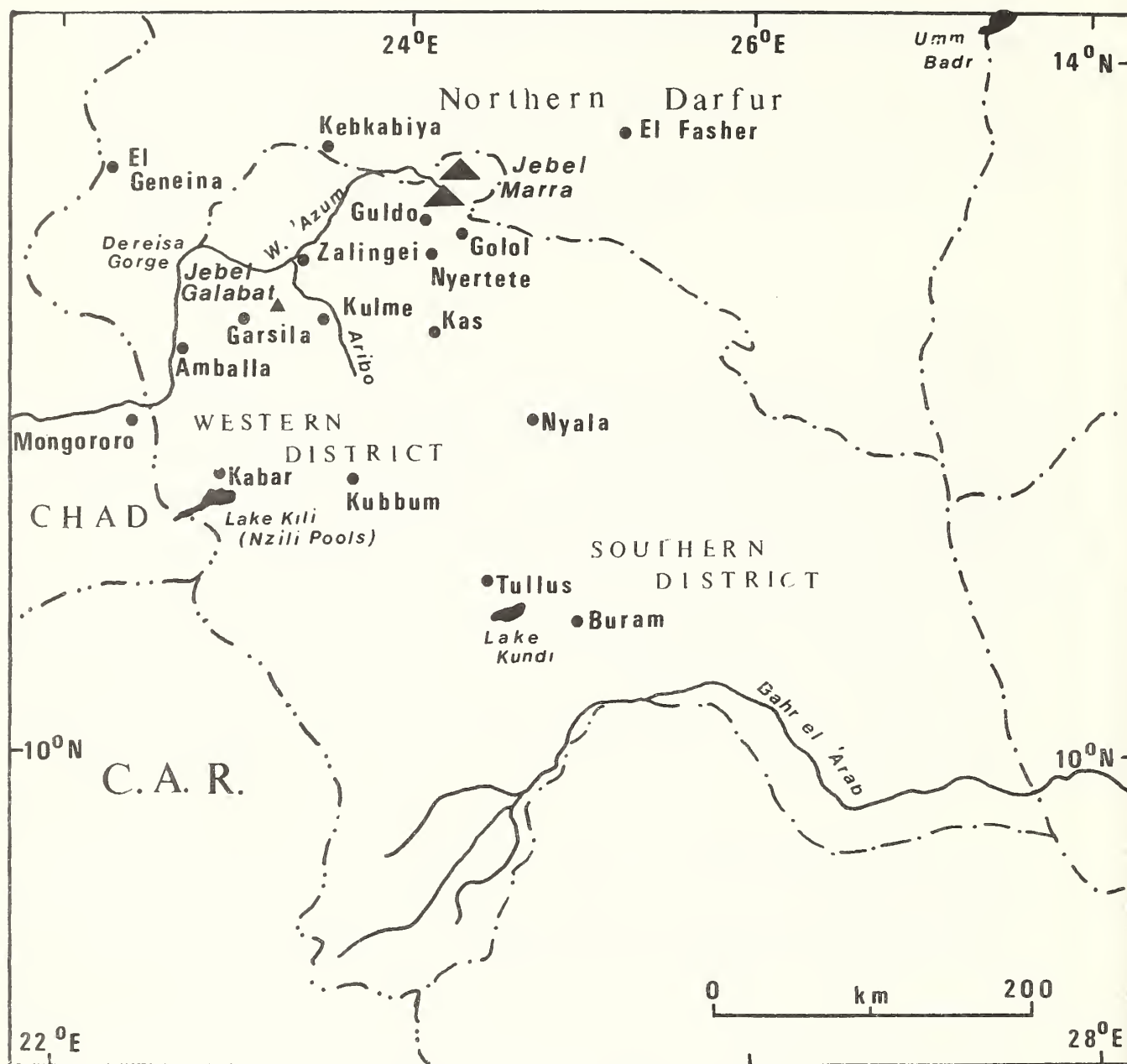


Figure 1 Map of the main part of Darfur showing all geographical names mentioned in the text

Table 1 Trend analysis of rainfall in Darfur

Station	Record period	Average (mm)	Rainfall regression equation (on 5-year running mean)
Zalingei	1931-1976	637.8	$y = 655.53 - 0.31x$
El Geneina	1928-1976	545.8	$y = 576.26 - 1.49x$
El Fasher	1917-1976	283.7	$y = 331.27 - 1.45x$
Nyala	1920-1976	473.0	$y = 547.42 - 2.25x$

HYDROLOGY

There has been a marked decline in vegetative cover over the last few years, with much overgrazing and increased areas of cultivation. River flow is now of shorter duration, and sheet erosion is becoming widespread with some gullying.

Lynes remarked on the lack of surface water in the dry season, but some permanent waters may have escaped his notice. At the present time (even after the recent drought) 'lakes' Kundi and Kili usually contain some water all year round. There are also ox-bow lakes along the 'Azum, for example at Amballa and Mongororo, which normally contain water. At El Fasher the improvement of the town pond has ensured an almost permanent area of surface water and at Zalingei, Nyala recent excavations for brick making and building earth have created permanent, if small, bodies of water.

VEGETATION

In the past the Wadi 'Azum basin has provided some of the best dry season pasture grounds along the southern edge of the Sahara. Studies carried out in 1964-65 (F.A.O. 1968, Wickens 1977) and by the same ecologist in 1977 (Hunting Technical Services 1977) show that the vegetation is now very much poorer. The most serious degradation, arising from increased cultivation and overgrazing, is probably occurring in the alluvial valleys of the Wadi 'Azum and its major tributaries. The most important tree is *Acacia albida*, but cultivation has reduced natural regeneration to a negligible level and mature trees are being lopped and burnt. Government plans for irrigation schemes will cause even more degradation of *Acacia albida*. No adequate conservation measures are apparently being taken.

There have been, on the other hand, certain improvements to the vegetation as a bird habitat. While the 150,000 ha of gazetted or proposed forest reserve are that only in name, 2,600 ha of plantation on Jebel Marra have undoubtedly provided new habitats. Similarly the area under fruit, particularly mango and guava, has greatly increased in recent years and now provides shelter and food for a variety of birds.

STATUS OF SELECTED BIRDS

OSTRICH *Struthio camelus* Very uncommon and in danger of extinction through egg collection and shooting for plumes. Eggs are still used to decorate mosques and private houses: in 1977 they were offered for sale in Darfur for as little as 10 piastres (US \$ 0.28) and in Khartoum tourist shops for £SUD 5 (US \$ 14). Prime white plumes were on sale in Mongororo in February 1977 at £SUD 3 per rotl (about 430 g). I saw one young bird from the ground south of Kabar, but saw several from the air. One nest containing 12 eggs was seen from a helicopter a few kilometres east of Zalingei in 1965 (Wickens, pers. comm.). Recent aerial surveys (Watson et al. 1977) gave estimates of 3,600 Ostriches in Darfur in three main areas, about 250 centred on 11°30'N, 23°30'E, nearly 3,100 in 10°30'-11°30'N, 24°00'-27°00'E (sandy soils with *Combretum* woodland) and nearly 300 centred on 10°00'N, 27°00'E. Wilson (1976) has reviewed briefly the history of the Ostrich in Darfur.

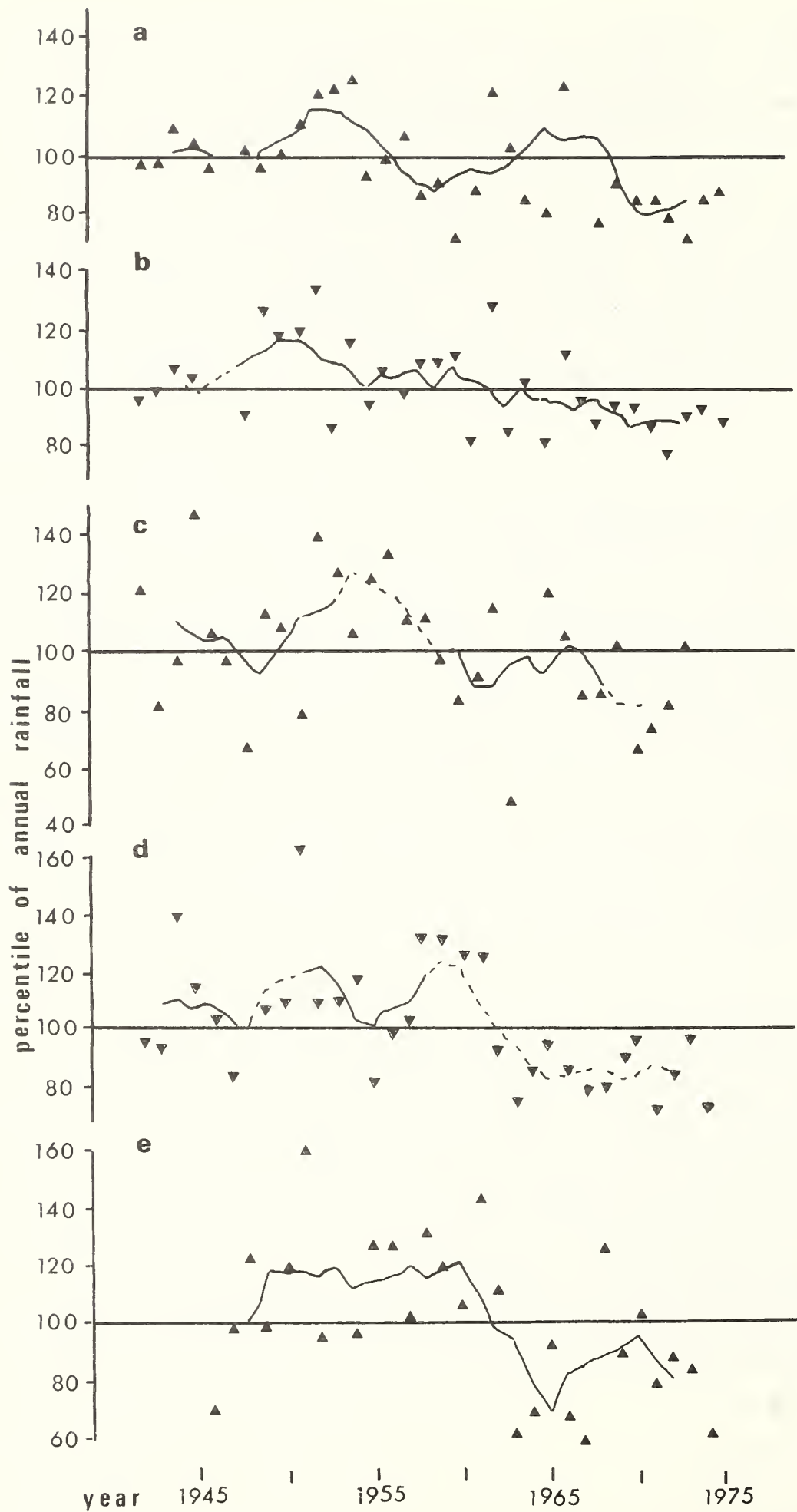


Figure 2 Plots of 5-year running means of annual rainfall for five locations in western Darfur (a, Kas, $\bar{x}$ = 560 mm: b, Garsila, $\bar{x}$ = 673 mm: c, Kubbun, $\bar{x}$ = 675 mm: d, Guldo, $\bar{x}$ = 646 mm: e, Nyertete, $\bar{x}$ = 847 mm: all for 1943-75 except Nyertete 1948-75)

LITTLE GREBE *Poliocephalus ruficollis* Present on the brick ponds at Zalingei, November 1976 to February 1977 and again in October 1977. Probably resident and certainly a winter breeder as young birds accompanied two adults throughout December 1976 and January 1977. Winter breeding recorded at Umm Ruaba in Kordofan (Hogg 1958).

BUFF-BACKED HERON *Bubulcus ibis* Summer breeding visitor, as noted by Lynes. First large flocks (50-100 birds) noted at Nyertete, 22 June. By no means all birds breed and where nesting in company with Abdim's Stork and Sacred Ibis (mainly in *Balanites aegyptiaca* and occasional *Adansonia digitata*), the breeding season was slightly later, from mid-July. Occasional birds may pass the winter in Darfur, some being recorded at Umm Badr (14°15'N) on the Darfur/Kordofan border in January 1955 (Mackenzie 1955).

GREY HERON *Ardea cinerea* Common winter visitor. A few stayed through the rainy season but were not observed to breed although breeding in the rains has been noted in Kordofan (Hogg, pers. comm.).

BLACK-HEADED HERON *Ardea melanocephala* Lynes could not estimate its status but it is now definitely a common resident throughout western Darfur, breeding in the early rains. Several nests were being constructed in fan palms *Borassus aethiopum* in Kabar village 30 April 1977. A colony of 140 pairs in company with Sacred Ibis (31 pairs) and Abdim's Stork (5 pairs) started building operations, all in *A. albida* in early May in Zalingei. Young herons hatched from about 28 June, adults quit the nesting colony in late September and the last young left the nests 16 October 1977. July breeding is recorded for the species along the Nile (Hogg 1950).

GOLIATH HERON *Ardea goliath* One record 5 km west of Zalingei, 27 October 1977. Not recorded by Lynes but apparently fairly common in south-east Darfur (Madden 1934). In western Darfur probably a vagrant at the extreme northern edge of its range.

HAMERKOP *Scopus umbretta* Probably less common than previously as only three records: two birds on 15 November 1976, one on 17 November 1976 at Amballa and one on 19 January 1977 at Zalingei. No signs of nests and may possibly be a non-breeding visitor. Madden (1934) has one record.

BLACK STORK *Ciconia nigra* One in Zalingei in latter part of January and early February 1977. Probably uncommon palaearctic winter visitor or passage migrant to and through the alluvial valleys in addition to the winter visitors to Jebel Marra noted by Lynes.

ABDIM'S STORK *Ciconia abdimii* The earliest of the intra-African migrants in Darfur. Common throughout by mid-April, well before the normal rains begin. Breeds commonly in towns and villages, most often in *Balanites aegyptiaca*, at least as far north as El Fasher and Kebkabiya. Most clutches set by end of May and few birds seen after 19 October 1977.

It also appears to be an early arrival farther east being recorded at Bara before 2 May, Shendi on 16 May but nesting slightly later, in June. Departure from Khartoum 10-20 October but still at Sodiri on 13 November (Hogg, pers. comm.).

SADDLE-BILL STORK *Ephippiorhynchus senegalensis* Although not recorded by Lynes this unmistakable stork is widespread and not uncommon, probably resident and breeding (during the rains), in Darfur in suitable habitats.

MARABOU STORK *Leptoptilos crumeniferus* Two sightings: three birds on 17 November 1976 south of Kabar and one bird on 26 January 1977 at Zalingei confirming its vagrant status noted by Lynes.

SACRED IBIS *Threskiornis aethiopicus* Generally a summer breeding visitor throughout the province but with small numbers (scattered groups of 1-3 birds) overwintering where there is permanent water. Visitors arrive later than Abdim's Stork and about the same time as the Buff-backed Heron. On the other hand they apparently stay later in Darfur than either of these two species and were still present in numbers at the end of October 1977 in and around Zalingei.

HADADA *Hagedashia hagedash* One seen and several heard calling at Kabar, 26 May 1977, probably confirm it as an occasional vagrant, as noted by Lynes.

KNOB-BILLED GOOSE *Sarkidiornis melanotus* The status appears to have changed from summer passage migrant to common rainy season visitor with some birds breeding. First birds were noted on 7 June and then in numbers from 30 June. Several pairs had nests in hollow *A. albida* trees on the flood plain of the 'Azum 5 km north-east of Zalingei: the one nest examined had five eggs (two of which measured 56.9 x 38.5 mm and 54.3 x 38.5 mm and weighed 48.6 and 45.8 g respectively) on 1 August and two additional eggs two days later.

VULTURES All species appear to have undergone a drastic reduction in numbers throughout most of Darfur. I have records of: one Nubian Vulture *Torgos tracheliotus* which had got itself partially trapped in a small acacia bush 20 km west of Zalingei in the late evening 19 November 1976; one Egyptian Vulture *Neophron percnopterus* overflying Zalingei on 18 December 1976; one Hooded Vulture *Aegypius monachus* at Kebkabiya about mid-day on 3 June 1977; two Hooded Vultures roosting in Zalingei town on 12 August 1977; and two groups of the brown phase of the White-backed Vulture *Gyps bengalensis*, one of seven birds on the ground 17 km east of Zalingei and one of five birds on the ground 12 km east of Kas, both on 7 September 1977 towards the end of the rains.

No vultures were ever present at Zalingei slaughter house throughout late 1976 and the whole of 1977 nor were any seen at the several weekly village slaughterings visited. Seven Egyptian Vultures were noted at El Fasher town midden on 1 November 1977.

BATELEUR *Trochopius ecaudatus* Fairly common in the south of the province in the Buram and Tullus areas. Never seen north of Nyala or in western Darfur and its range is probably being compressed towards the south.

FISH EAGLE *Haliaeetus vocifer* Status has changed since 1920. From being an occasional summer visitor or migrant it is now a fairly common resident in suitable localities. Several were present at Lake Kundi in Southern District throughout the winter and there were four distinct breeding territories at Lake Kili. A single bird was seen most days at Zalingei brick ponds throughout January and February 1977.

BLACK KITE *Milvus migrans* Lyne's general remarks are endorsed. Large concourses, of several thousands, arrived in Zalingei on almost exactly the same dates as in 1920 - 26 June, 27 June, 1 July, 10 July 1977. A slightly earlier passage was recorded in Nyertete on 20 June. Several hundreds of birds stayed in Zalingei throughout July and August, and an estimated three thousand in Nyala.

GREY KESTREL *Falco ardosiaceus* Resident in small numbers throughout the year at least as far north as Zalingei where a pair roosted throughout the winter 1976-77 in the lower town at the confluence of the Wadi Aribi and the 'Azum. Numbers augmented in the rains by visitors.

FOX KESTREL *Falco alopex* Resident and late dry/early rains season breeder. A pair at Jebel Galabat were feeding fledged young, 8 July 1977.

SECRETARY BIRD *Sagittarius serpentarius* While being the national emblem of the modern Sudan and enjoying complete (and undoubtedly real) protection, the Secretary Bird remains uncommon to rare. Eight records, all of single birds except one: 22 April, 2 November, 17 November (of one and of two birds on recently burnt areas) 1976, 10 January, 1 May, 1 July and 12 August 1977. Probably resident and not just an off-season visitor as considered by Lynes.

SCALY FRANCOLIN *Francolinus squamatus* Present in the "gallery forests" (Wickens 1977) on Jebel Marra. Lynes did not visit these areas - at least not according to his itinerary - and it is possible that further exploration would reveal other forest species on Jebel Marra. Recorded from Jebel Marra by Cave and Macdonald (1955) but otherwise noted in the Sudan only from Equatoria Province.

STONE PARTRIDGE *Ptilopachus petrosus* Much reduced: resident in a scattered and irregular distribution, no longer common throughout as heretofore. A family group of 10-12 birds was seen in a typical habitat of laterised soils south of Kabar although the birds were actually foraging in a clump of bamboo. A second record was of several groups in a burnt out plantation of *Cupressus* above Golol on Jebel Marra at about 2,000 m.

GUINEAFOWL *Numida meleagris* Much reduced in populated areas and in the vicinity of main towns. Still very common in remote areas and particularly in the south where access by vehicles is difficult or impossible during the rains breeding season.

CROWNED CRANE *Balearica pavonina* If there are, as Lynes indicated, only a small number of resident Cranes in Western Darfur, then there must be considerable seasonal movements. Two flocks of several hundred birds were seen on the 'Azum between Amballa and Mongororo on 29 December 1976. In Southern Darfur there is a more or less permanent winter population of several hundred at Lake Kundi.

ARABIAN BUSTARD *Otis arabs* and DENHAM'S BUSTARD *Neotis denhami* Common in Lynes' time, the resident population of the Arabian Bustard is probably extinct or nearly so. The seasonal movement of a probably more southerly population continues, in seemingly greatly reduced numbers. Sixteen birds (groups of 5, 1, 1, 8, 1) were noted flying south on 17 November 1976, one bird having been noted earlier on 28 October; all of these were south of Kabar. Although the northward passage was waited for in 1977 only three birds were noted on 24 June, flying strongly towards the north 15 km west of Nyertete.

I had no sightings of Denham's Bustard although I was presented with one shot in mid-December 1976. Formerly scarce, it is probably almost extinct in Darfur.

Birds of both species, presumably residents were present in Sodiri in Kordofan in November to February and between Jebel Meidob and 'Atrun (Bir Natron) in Northern Darfur in December-January in the period 1938/39 (P. Hogg, pers. comm.).

BLACK-WINGED STILT *Himantopus himantopus* A much more common winter visitor than suggested by Lynes, and not at all local, occurring along the length of the 'Azum from Zalingei to at least Amballa. Earliest records were on 29 October 1976 at Amballa and 28 October 1977 at Zalingei. Latest record was 11 February 1977.

EGYPTIAN PLOVER *Pluvianus aegyptius* A few noted on 22 August 1977 at Zalingei. However, it was common on the 'Azum at Amballa throughout the winter of 1976-77; a resident breeding population is probably established in the far west of Darfur. Perhaps these are an offshoot colony from the Bahr el 'Arab population which was quite conspicuous in March 1974 (Field 1974).

SPECKLED PIGEON *Columba guinea* Common resident in towns and in country throughout, breeding occurring in most months. Particularly common in areas of the Fan Palm *Borassus aethiopum* in which several nests were found, thus confirming the preference indicated by Harwin (1963) in Nigeria. At least in the Sudano-Sahelian zone the Speckled Pigeon has an apparent affinity with this palm as a nest site.

GREEN PIGEON *Treror waalia* Common where there are wild fig trees, to which it is apparently confined having not made any transition to cultivated fruits.

BROWN PARROT *Poicephalus meyeri* Very common, particularly in the *A. albida* areas as far west as Amballa. Two pairs feeding young in nests, end of January 1977.

RED-HEADED LOVEBIRD *Agapornis pullaris* Not recorded by Lynes. Fairly common along the whole of the Sudan/Chad boundary in Western Darfur, particularly from November to February. Recorded on the Wadi Barei at 13°00'N 23°00'E; probably representing a northward extension of its range.

GREY PLANTAIN-EATER *Crinifer zonurus* Has probably benefitted from man's activities and has spread everywhere that mangoes and guavas grow; can be considered abundant. Diet not confined to fruit trees, however, as leaves and winged termites found in the stomach of one bird.

BROAD-BILLED ROLLER *Eurystomus glaucurus* Common summer visitor in the *A. albida* zone. Probably more plentiful and widespread than in Lynes' time. Very active. Several breeding pairs in Zalingei throughout July and August.

ABYSSINIAN GROUND HORNBILL *Bucorvus abyssinicus* Although found in various habitats is much more common in the *Acacia albida* alluvial zones than elsewhere. Normally in pairs with one young, identification being based on facial colours and casque characteristics. Congregations of six or more foraging birds were generally seen in the late afternoon or evening. Nests are probably mainly in hollow *A. albida*. One 1-week-old nestling was being fed by both parents on 28 July 1977. The booming call is not strictly confined to the breeding season - recorded 2 February, 8 March, 22 April, 24 May, 7 July and then almost continuously through July and August, almost all calls being noted before or around dawn. Calling was again heard 13-19 October.

BLACK-BREASTED BARBET *Lybius rolleti* General status given by Lynes confirmed in the northern savanna-like extensions. Has now successfully colonised the Eucalyptus plantations at Nyertete from where it probably forages out to mango and guava orchards.

BLACK-HEADED GONOLEK *Laniarius barbarus* and CRESTED HELMET SHRIKE *Prionops cristata* Both shrikes are common residents but subject to local movements. They move out of the *A. albida* zone in the rainy season when the trees are leafless.

The Gonolek has successfully colonised the *Eucalyptus* plantations in the Nyertete area.

YELLOW-BILLED OXPECKER *Buphagus africanus* Is now resident throughout most of Darfur as far north as Zalingei. Several records in Zalingei for December 1976/January 1977 and March/April 1977.

PIED CROW *Corvus albus* Observations largely confirm those of Lynes - the Pied Crow is still a winter visitor throughout most of the province. First arrived in the Zalingei area, 28 October 1976, a large number of birds remaining until well into the next rainy season, last recorded 23 July 1977. First arrivals in the following year after the rains, 14 October 1977. Nyala is evidently large enough to provide an attraction for Pied Crows even during the rains: several large flocks each of over 100 birds inhabited Nyala throughout July-August rains of 1977.

Most birds were associated with human activity, foraging usually in pairs. Only three breeding records, each of a single nest, noted in 1977. One successful brood in an *Acacia albida* in Zalingei town in early June, another in a *Khaya senegalensis* 5 km west of Nyertete raised a brood in late June/early July, and one in a baobab *Adansonia digitata* 3 km north of Nyala airfield was in the process of being built in early June but whether a brood was reared is not known.

FAN-TAILED RAVEN *Rhinocorax rhipidurus* The 1920 status is largely confirmed. Common at Dereisa gorge in addition to Jebel Marra. The slaughter slabs in the towns and villages have become important food sources. At Zalingei slaughterhouse the first birds usually appeared just after first light; if these birds roosted on Jebel Marra, over 100 km north-east, they would have had to travel during darkness.

PIAPIAC *Ptilostomus afer* Has apparently extended its range. Mackworth-Praed & Grant (1960) give its distribution as southern Sudan, associated with the Fan Palm *Borassus aethiopicum* and subject to erratic seasonal movements. It is now resident in Darfur as far north as Kas and Garsila, where in both villages there is suitable habitat in the form of *B. aethiopicum* groves and ample food supplies from insects disturbed by the large numbers of domestic animals. It is probably extending its range still farther northwards: recorded at Zalingei (12°54'N), early March and mid-April 1977 and at Nyertete (12°58'N) June 1977. Its presence in Zalingei may be a result of movement along corridors of suitable habitat, relicts of former savanna and gallery forest conditions (Wickens 1977).

The Corvidae in Darfur have been treated in detail elsewhere (Wilson 1981).

WHITE-CROWNED CLIFF-CHAT *Thamnolea coronata* Occurs on the isolated volcanic plug of Jebel Galabat 30 km west of Zalingei as well as on Jebel Marra where Lynes found it. A pair were feeding young at a nest on J. Galabat on 8 July 1977. Probably also occurs on the hills and crags of the Dereisa gorge.

DISCUSSION AND CONCLUSIONS

It is possible that Darfur in the late 1970s was at the end of a gradual decline in rainfall over a 50-year period, just as it was in the early 1920s. Climatic change, however, has had little effect on vegetation in the alluvial valleys of the Wadi 'Azum and its major tributaries. Thus, while climatic change can explain some of the changes in bird distribution and movement it does not explain them all.

Of those species which have been affected beneficially by man's activities the Black Kite and the Pied Crow probably provide the best examples. The Black-headed Heron also appears to have adapted successfully to human influences and in fact a measure of commensalism would explain its presence as a breeding bird in Zalingei and Kabar. Other birds which have benefitted from man's activities are the Sacred Ibis, the Saddle-billed Stork and the Fish Eagle: increases in water surface areas from irrigation schemes often coupled with the planting of trees, which provide nesting sites, are undoubtedly beneficial to these species.

The relatively high density of the Ground Hornbill is also related to human activity but in a rather anomalous way. The even-aged stands of *Acacia albida* date from the period when western Darfur was a battleground between the Sultan and his sedentary cultivators on the one hand and the Arab pastoralists on the other. In Lynes' time - Ground Hornbills were present but apparently not in considerable numbers - these trees would be about 25 years old and not yet mature. In the mid-1970s the remaining stands are comprised of mature and over-mature trees, many of them hollow. These provide nesting sites for this hornbill (and others) and have probably resulted in a rapid increase in population over the last 30 years or so. With increasing destruction of these trees it is likely that the Ground Hornbill population will decline in the near future. A decline of other species, for example the shrikes, the parrots, the Broad-billed Roller and the Knob-billed Goose, which make use of the ample dry season cover and/or nesting holes provided by *Acacia albida*, may also be expected.

The direct effects of man's activities are most in evidence in the game birds, the vultures and the Ostrich. Ducks, geese, Guinea fowl and the Stone Partridge have all suffered from the increased mobility of people and the general availability of firearms. The bustards are in real danger of extinction although the smaller ones are still relatively numerous. The most spectacular crash in the bird populations of Darfur (and of the Sudan in general) has certainly been in the case of vultures. Many former members of the Sudanese Civil Service and other long time inhabitants of the country have remarked on it (P. Hogg, pers. comm.; A. Pettit, pers. comm.). The reason is perhaps obvious and provides an excellent example (chemical control of tsetse flies is another) of the consequences of the application of control measures to one species without thought to the effects on others. Reduction in vulture populations can almost certainly be related to the indiscriminate use of strychnine to poison hyaenas. In Darfur this was done on an enormous scale as can be gathered from government archives for 1947-52 for Southern Darfur district which record almost 700 hyaenas and almost as many jackals poisoned (and carcasses noted!) during the period (Wilson 1979). This continues, as it does in Mali where vultures are also uncommon (pers. obs.). On the other hand where poisoning is not practised and where hyaenas are still common, as in the case of Ethiopia, vultures are still among the most obvious birds and in fact make up more

than 90 per cent of the raptor biomass.

The commonness of the Ostrich has probably always been rather relative but they have undoubtedly suffered in numbers from egg-taking and shooting for plumes. It has been pointed out to me by the late L. H. Brown that in areas where Ostriches are fairly numerous, as in the Nairobi National Park, over half the eggs laid are never incubated and thus a harvest of kinds might be possible.

ACKNOWLEDGEMENTS

I am indebted to P. Hogg, J. S. Monk and G. E. Wickens and the late L. H. Brown for comments on an earlier draft of this paper. I acknowledge gratefully the opportunity which was presented to me by Hunting Technical Services to be in Darfur. My wife's help with the field observations was invaluable.

REFERENCES

- CAVE, F.O. & MACDONALD, J.D. (1955) *Birds of the Sudan*. Edinburgh: Oliver & Boyd
- FIELD, P.A.G. (1974) Report on a feasibility study on a proposed conservation area in Southern Darfur, Sudan. London: Ministry of Overseas Development
- F.A.O. (1968) Land and water resources survey of the Jebel Marra area. Rome: FAO
- HARWIN, R.M. (1963) Thoughts on a five weeks study in Northern Nigeria. *Bokmakierie* 15: 10-15
- HOGG, P. (1950) Some breeding records from the Anglo-Egyptian Sudan. *Ibis* 92: 574-578
- HUNTING TECHNICAL SERVICES (1977) Agricultural development in the Jebel Marra area. Borehamwood, England: Hunting Technical Services
- LYNES, H. (1924-1925) On the birds of north and central Darfur, with notes on the west-central Kordofan and north Nuba provinces of British Sudan. *Ibis* XI (6): 339-446, 648-719; XII (1): 71-131, 346-416, 541-590, 757-797
- MACKENZIE, P.Z. (1955) A record of the species of birds observed and collected at Umm Badr lake in north-west Kordofan in January 1955. *Sudan Notes Rec.* 36: 176-179
- MADDEN, J.F. (1934) Notes on the birds of southern Darfur. *Sudan Notes Rec.* 17: 83-101
- MADDEN, J.F. (1935) The birds of southern Darfur, Part II, Passerines. *Sudan Notes Rec.* 18: 103-118
- MADDEN, J.F. (1946) Bird migration at El Fasher, 1944. *Sudan Notes Rec.* 27: 221-224
- NICHOLSON, S.E. (1978) Climatic variations in the Sahel and other African regions during the past five centuries. *J. Arid Env.* 1: 3-24

- SEVENTY, D.L. (1977) The use of data on the distribution of birds to monitor climatic changes. *Emu* 77: 162-166
- WATSON, R.M., TIPPETT, C.I., RIZK, F., BECKETT, J.J., JOLLY, F. & CASBON, F. (1977) Sudan national livestock census and resource survey. Nairobi: Resource Management and Research Limited
- WICKENS, G.E. (1976) Speculations on long distance dispersal and the flora of Jebel Marra, Sudan Republic. *Kew Bull.* 31: 105-150
- WICKENS, G.E. (1977) The flora of Jebel Marra (Sudan Republic) and its geographical affinities. *Kew Bull. Additional Series* V.
- WILSON, R.T. (1976) The Ostrich, *Struthio camelus*, in Darfur, Sudan. *Bull. Brit. Orn. Cl.* 36: 123-125
- WILSON, R.T. (1977) Temporal changes in livestock numbers and patterns of transhumance in Southern Darfur, Sudan. *Journal of Developing Areas* 11: 493-508
- WILSON, R.T. (1979) Wildlife in Southern Darfur, Sudan: Distribution and status at present and in the recent past. *Mammalia* 43: 323-338
- WILSON, R.T. (1981) The Corvidae in the Sudan Republic with special reference to Darfur. *Afr. J. Ecol.* 19: 285-294
- WILSON, R.T. & BALL, D.M. (1979) Morphometry, wing loading and food of western Darfur birds. *Bull. Brit. Orn. Cl.* 99: 15-20

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NOTE SUR L'ENVAHISSEMENT DU NORD DU SENEGAL PAR LE MOINEAU DORE
PASSER LUTEUS (LICHTENSTEIN) EN PERIODE DE REPRODUCTION

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Received 18 February 1982

Revised 18 March 1982

Les travaux de Morel & Morel (1973 a et b, 1976) sont fondamentaux pour la connaissance de ce Plocéidé granivore, particulièrement pour le comportement reproducteur. Aussi nos observations de terrain pour les années 1979 à 1981 se référeront constamment, et suivant le même plan à leur article de 1976 (désigné MM dans la suite). Les coordonnées des lieux cités sont données en annexe.

Le Moineau doré est une espèce importante dans l'Afrique sahélienne. C'est sans doute l'oiseau le plus abondant, notamment au Sénégal et dans le sud de la Mauritanie où a eu lieu cette étude; la compréhension de l'écologie et des mouvements de cette espèce fait partie des objectifs du Projet FAO/GCP/RAF 126 (BEL) d'assistance technique à l'OCLALAV (Organisation Commune de Lutte Antiacridienne et de Lutte Antiaviaire) pour la protection des cultures céréalières.

DYNAMIQUE DE REPRODUCTION

Nids

Les espèces ligneuses utilisées: les arbres épineux sont seuls choisis. Si *Balanites aegyptiaca* est presque exclusivement le support des nids dans le Ferlo sénégalais, vaste savane arbustive au sud du fleuve Sénégal, d'autres espèces épineuses peuvent servir d'abri ailleurs: *Acacia senegal* et *A. raddiana* en Mauritanie et à l'est de Saint-Louis et surtout *Al albida* en Mauritanie et au sud de l'axe Louga-Linguère.

La taille des nids semble dépendre de la disponibilité en matériaux: les nids sur *A. albida* sont généralement plus petits que ceux établis sur *B. aegyptiaca* et les mâles qui construisent les nids se disputent âprement les matériaux, peu abondants là où *A. albida* domine.

Le nombre de nids par arbre reste stable dans le Ferlo par rapport aux données connues (MM): 1.5 à Diaglé; 1.4 à Madina Ndiatébé; 1.3 à Maka; mais certaines colonies sont fort dispersées avec un pourcentage élevé d'arbres inoccupés (0.85 nid/arbre et 41% d'arbres inoccupés sur 259 à Niassanté en 1979). Par contre, les densités de nids par arbre sont plus élevées au sud de l'axe Louga-Linguère, surtout sur *A. albida*: 3.4 et 5.4 à Louga en 1979 et 1980; 2.5 à Ouarak en 1981; 2.1 à Kébémér en 1981, avec une moyenne et 5.9 nids par *A. albida*. Dans la zone sud, la taille des arbres dépasse généralement 4 m, et plus de 20% des nids sont situés plus haut tandis qu'en Mauritanie, la majorité des nids se situent à moins de 2 m de haut en raison de la faible taille des arbres de cette région.

Le densité de nids à l'hectare est proportionnelle à la densité des

arbres. Les observations varient de 10 à 200 nids/ha - le plus souvent de 20 à 100 - avec les moyennes les plus basses dans la zone sud, en raison de la faible densité des arbres épineux.

Chronologie de la reproduction

Par rapport aux données publiées (MM), nous trouvons des reproductions nettement décalées vers les mois de septembre et même octobre. Les dates de ponte peuvent être résumées comme suit pour les trois dernières années:

Ferlo et Mauritanie	:	5 au 10 sept.	:	1979
Maka	:	1 au 5 oct.		
sud de Louga	:	20 oct.		
Ferlo et Mauritanie	:	15 au 25 août	:	1980
Tal Baklé	:	15 au 25 sept.		
nord de Louga	:	25 au 30 sept.		
Sagatta - Pékesse	:	1 au 5 oct.		
Ferlo	:	25 au 30 août	:	1981
Sagatta	:	5 au 15 sept.		
Ouarak - Linguère -				
Sagatta - Pékesse -				
Kébémer	:	1 au 5 oct.		
Pire - Baba-Garage	:	20 au 25 oct.		

Succès

Comme il a été remarqué (MM), le succès des colonies à l'envol est très variable (2.1 ± 1.5 oisillons/nid). En 1981, nous avons trouvé des moyennes de 2.77 oisillons/nid à l'envol de 21 oct. à Kébémer (3.27 si on ne compte que les nids occupés) et 2.53 oisillons/nid le 6 nov. à Mécké sur 70 nids. Ces données indiquent une bonne productivité dans une région colonisée pour la première fois à des dates très tardives.

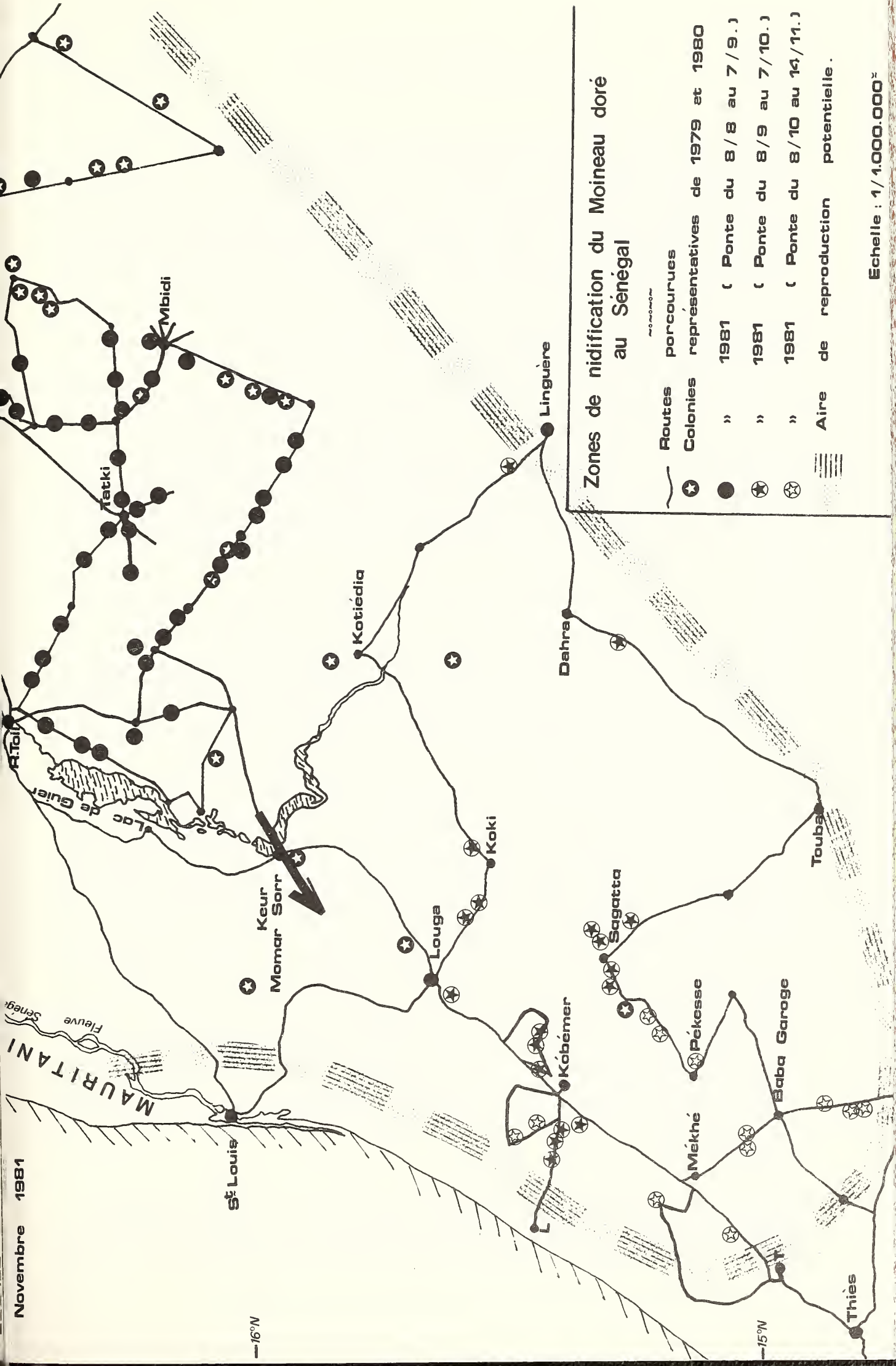
REGIME ALIMENTAIRE DES OISILLONS AU NID

Nos études n'ont pas approfondi cet aspect mais la présence des grains de petit mil (*Pennisetum*) trouvés dans le gésier de quelques oisillons au nid confirme la possibilité, envisagée par Bortoli & Bruggers (1976) d'un régime mixte (graines et insectes).

DISTRIBUTION ET HABITAT PENDANT LA REPRODUCTION

(a) Au nord, l'absence de nids en activité au-delà du 18°22'N et de moineaux dorés dans la région d'Atar était signalée en 1975 (MM). Des observations récentes (A. Din, comm. pers.) font état de dortoirs et de nids de Moineaux dorés en 1980 et 1981.

(b) A l'est, les moineaux dorés sont abondants au Mali (S. Manikowski, comm. pers.) au Niger (FAO, 1982), au nord de la Haute-Volta (L. Bortoli, comm. pers.) et du Nigeria (C.O.P.R. 1977, Sharland & Wilkinson 1981), à l'est du



Tchad (J. Newby 1980) ainsi qu'au Soudan, en Ethiopie et en Somalie (R. Bruggers, comm. pers.).

Il semble y avoir des relations entre les populations des bassins du Sénégal et du Niger car, d'après les rapports de l'OCLALAV, les Moineaux dorés seraient abondants à Aioun-el-Atrouss, Yélimané, Nioro du Sahel, Nara, Néma ainsi qu'à l'Office du Niger.

(c) Vers le sud, des mouvements d'invasion, qui seraient le reflet de la dégradation de l'habitat (Morel & Morel 1978), se sont développés au Nigeria (C.O.P.R. 1977) et plus récemment au Sénégal.

En 1975, les nids les plus méridionaux recensés au Sénégal étaient situés au nord de Linguère et il n'était pas exclu d'en trouver plus au sud à condition d'y rencontrer le support adéquat, *B. aegyptiaca* (MM). Les colonies étaient cependant rares avant cette date puisqu'elles n'ont été notées qu'en 1961 et 1967 (Morel & Morel 1978). Depuis 1976, nous avons trouvé, de manière régulière et croissante des nids au sud et à l'ouest du Ferlo, considéré comme zone favorable. L'emplacement des nidifications découvertes entre 1979 et 1981 et l'étendue de la zone de reproduction en 1981 figurent sur la carte 1.

On y remarque des colonies jusqu'au sud de Baba-Garage (14°49'N, 16°28'W) à près de 150 km au sud de la partie occidentale du Ferlo.

Un déplacement de cette importance devait se traduire par des vols nettement orientés. La chance nous permit de découvrir un important point de passage entre le Ferlo et la zone sud, à Keur Momar Sarr. Nous avons constaté en effet la coïncidence des dates d'abandon des colonies du Ferlo avec celles d'installation de colonies nouvelles plus au sud.

Entre le 27 septembre et le 30 octobre 1981, sur la digue boisée de Keur Momar Sarr qui relie les deux rives du lac de Guier distantes d'environ 500 m à cet endroit, de nombreux comptages systématiques ont permis d'estimer un passage de 1.5 à 2 millions de moineaux dorés venant du Ferlo et se dirigeant vers le sud-ouest (carte 1). La taille des vols (15-20 individus) a permis de mesurer précisément l'importance de ce passage (27 min. à 212 max. moineaux dorés/minute à différentes heures de la journée).

Au cours des premiers comptages, la proportion de mâles atteignit 90-95%, ensuite elle s'inverse à partir du 12 octobre. Ceci correspond bien au décalage constaté entre les colonies du Ferlo et du sud car on sait que les mâles devancent les femelles pour choisir l'emplacement des colonies et les quittent les premiers. On nota parallèlement la disparition des mâles au Ferlo et l'envahissement brutal et massif des zones méridionales, comme celle de Kébémér par exemple.

CONCLUSIONS

La mise en évidence de ces déplacements orientés et le décalage quasi général entre les colonies de reproduction du Ferlo et celles situées au sud de l'axe Louga - Linguère (carte 1) constituent de sérieuses présomptions en faveur d'une double reproduction importante du Moineau doré

au Sénégal. La productivité de ces reproductions tardives semble satisfaisante et même meilleure que celle constatée dans le Ferlo. Ces observations éclairent d'un jour nouveau les mystères de la reproduction chez cette espèce très abondante et dont le taux de renouvellement de 2.1 à 2.3 poussins à l'envol par nid (MM) paraissait dérisoire. Vu l'échec des nidifications tardives observé dans le Ferlo (MM), il était admis qu'une seule nichée pouvait réussir au cours de l'année. Les observations récentes permettent de penser qu'une double reproduction est fort possible et même importante certaines années, mais dans des zones distinctes.

La pluviométrie, mieux répartie en 1981 qu'en 1979 et 1980, ne paraît guère pouvoir expliquer cet envahissement récent du Moineau doré vers le sud. En effet, la pluviométrie, ainsi que le développement graminéen, sont assez semblables dans le Ferlo et dans la zone sud et, à partir d'octobre, il n'y a pas plus d'eau libre ici que là.

Il s'agit donc d'un phénomène important et nouveau pour le Sénégal, dont le déterminisme reste obscur et qui mérite l'attention des ornithologues et des spécialistes de la protection des cultures, car cette espèce est sans doute la plus abondante au Sénégal et aussi la plus déprédatrice pour les cultures traditionnelles dans le Sahel (Ruelle 1982).

REMERCIEMENTS

Ces observations ont été faites dans le cadre du Projet FAO/GCP/RAF 126 (BEL) "Assistance technique à l'OCLALAV en matière de lutte contre les déprédateurs, en particulier les oiseaux granivores". Nos remerciements vont aussi à M L. Bortoli et à M et Mme G. J. Morel pour la lecture et la discussion du manuscrit.

RESUME

Les travaux concernant la reproduction du Moineau doré sont discutés et complétés par des observations sur la dynamique de la reproduction (nids, chronologie, succès) et la distribution, en particulier au sud d'un axe Louga - Linguère, où une invasion massive à partir du Ferlo et des nidifications tardives constituent de sérieuses présomptions en faveur d'une double reproduction importante.

SUMMARY

Earlier studies of breeding in Golden Sparrows are amplified by observations on dynamics of reproduction (nests, timing, success) and distribution south of the Louga-Linguère axis, where there is strong circumstantial evidence for double breeding.

Gazetier

Aioun-el-Atrouss*	16°40N 08°37W	Néma*	16°38N 07°15W
Atar*	20°31N 14°03N	Niassanté	16°09N 15°35W
Baba-Garage	14°57N 16°29W	Nioro+	15°30N 08°36W
Diagle	16°13N 15°41W	Office du Niger+	14°30N 06°00W
Kébémér	15°21N 16°25W	Ouarak	15°31N 16°03W
Keur Momar Sarr	15°52N 15°59W	Pékesse	15°07N 16°25W
Linguère	15°23N 15°07W	Pire	15°01N 16°45W
Louga	15°38N 15°13W	Sagatta	15°17N 16°10W
Maka	15°52N 15°59W	Saint-Louis	16°01N 16°30W
Madina Ndiatébé	16°19N 14°08W	Tal Baklé	16°00N 16°23W
Mécké	15°07N 15°38W	Yélimané+	15°08N 09°35W
Nara+	15°10N 07°17W		

* Mauritania + Mali

BIBLIOGRAPHIE

- BORTOLI, L. & BRUGGERS, R.L. (1976) Nidification de *Quelea quelea* (L.) dans le delta central nigérien en 1976. PNUD/FAO-RAF 73/055, rapport interne (28p)
- C.O.P.R. (1977) *Quelea* investigations Project Nigeria. Final Report 1972-75. Centre for Overseas Pest Research, London, 57 p, multigr.
- F.A.O. (1982) PNUD/FAO 77/047 "Assistance à l'OCLALAV au niveau régional". Rapport final 1979-81
- MOREL, G.J. & MOREL, M-Y. (1973) Première observations sur la reproduction du Moineau doré, (*Passer luteus* (Licht.)) en zone semi-aride de l'Ouest africain. *Oiseau R.F.O.* 43: 97-118
- MOREL, M-Y. & MOREL, G.J. (1973) Eléments de comparaison du comportement reproducteur colonial de trois espèces de Plocéides: *Passer luteus*, *Ploceus cucullatus* et *Quelea quelea* en zone semi-aride de l'Ouest africain. *Oiseau R.F.O.* 43: 314-329
- MOREL, G.J. & MOREL, M-Y. (1978) Eléments de comparaison entre *Quelea quelea quelea* (L.) et *Passer luteus* (Lichtenstein) dans les savanes tropicales de l'Ouest africain. *Cah. ORSTOM, ser. Biol.* 13(4): 347-358
- NEWBY, P.J. (1980) The Birds of the Ouadi Rime-Ouadi Achim Faunal Reserve. A contribution to the study of the Chadian avifauna. *Malimbus* 2: 29-50
- RUELLE, P.J. (1982) Le Moineau doré, *Passer luteus* (Licht.), comme déprédateur des cultures en Afrique de l'Ouest. FAO-RAF 126 (BEL) rapport interne (16p)
- SHARLAND, R.E. & WILKINSON, R. (1981) The birds of Kano State, Nigeria. *Malimbus* 3: 7-30

EVALUATING THE BIRD REPELLENCY OF METHIOCARB

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Received 5 October 1981

Revised 30 March 1982

INTRODUCTION

The Red-billed *Quelea quelea*, while only one of the many ploceid weaver pest species in Africa, is probably the most numerous avian species in the world, and perhaps the most destructive. It ranges over floodplains in semiarid parts of Africa south of the Sahara (Magor 1974), inhabiting about 20% of the land area and adversely affecting the economies of 25 nations (De Grazio 1978). In Sudan, it occupies about 90% of the country's grain production areas and is responsible for damage to sorghum, rice, and wheat.

Because traditional farmers suffer a disproportionate share of the total bird damage compared with large cereal schemes, economical, simple, and appropriate methods of bird damage control are necessary for small plantings. This report summarizes the fieldwork accomplished in Sudan, Kenya, and Tanzania on the use and effectiveness of the chemical methiocarb (4-methylthio-3,5,-xylyl N-methylcarbamate) as a bird repellent on broad-cast seed and ripening grain. Methiocarb is widely used and registered for several crop application uses in the United States as a bird repellent and has been tested recently in Senegal (Bruggers 1979) and East Africa (Bruggers et al. 1981). At low levels of $R_{50} = 0.015\%$ to 0.178% (Shumake et al. 1976; Shefte 1982), it is a repellent to Red-billed *Quelea*, the principal bird pest in Africa, and other pest species in Sudan like Village Weavers *Ploceus cucullatus*, Red Bishops *Euplectes orix*, Golden Sparrows *Passer luteus*, and Masked Weavers *Ploceus taeniopterus*. Methiocarb is thought to repel birds by causing an illness-induced conditioned aversion (Rogers 1974, 1978).

METHODS

Ripening grain application

Demonstrations and trials were conducted between 1977 and 1980 with farmers and agricultural researchers on ripening sorghum, millet, and wheat in several provinces of Sudan. Repellency was evaluated for several bird species in wire or net enclosures of 2 m^3 to 8 m^3 placed over ripening crops and on entire fields of vulnerable cereal crops. Exposed cereal heads in the cages or in small fields were sprayed with portable Handi sprayers, B & M sprayers, and motorized CP3 knapsack sprayers; large fields were sprayed using aircraft. In all enclosure studies, the birds were introduced after the heads had been sprayed. Additional treatment details for certain specific tests are described under results. Replications were used whenever possible.

Broadcast seed treatment

The trial was conducted at the Agricultural Research Corporation (ARC) station at Wad Medani. Two replicate 600 m² adjacent bands in each of two 4.3 ha ricefields were seeded at a rate of 77 kg/ha. The seed for one of each pair of bands was treated with methiocarb (0.20% by seed weight), and Rhoplex AC 33 adhesives (48% solids -- 0.10% by seed weight) in a water solution in a barrel mixer, sun-dried (water evaporated), and handsown into 7.5 to 10.0 cm furrows and covered with 2-3 cm of soil. The fields were irrigated after seven days, simulating planting conditions at the Gezira Scheme. Counts were made of the proportion of damaged to undamaged seeds, the number of plants in a 625 cm² sampling unit, and the number of birds feeding in the trial fields during peak activity periods. Seeds and seedlings were collected for residue analysis.

RESULTS AND DISCUSSION

Ripening grain application

The initial work with methiocarb in Sudan was considered either promising (Martin & Jackson 1977) or inconclusive due to insufficient bird pressure (Martin 1976). Since 1977 several other field trials and enclosure studies have been conducted in Sudan to evaluate further the effectiveness of methiocarb as a means of reducing damage by queleas and other birds to cereals.

Enclosure tests In a test near Jodah (coord. 12°30'N x 33°0'E), in which queleas and Village Weavers were placed in net enclosures in a sorghum field with alternative food, excellent protection was achieved with 1 to 3 kg of methiocarb/ha head sprays (Table 1). In this test, each head was treated with 5 cm³ of either a 0.09% or a 0.27% methiocarb suspension with a B & M sprayer. No more than 2.6% damage occurred in the treated enclosures compared with 42.6% in the untreated enclosure (Table 1). Damage was from 16 to 41 times greater in the untreated enclosure and the yield was from 94% to 98% less. The birds consumed from 20 to 43 g of alternative food in the untreated enclosures compared with 60 g in the treated enclosure. Methiocarb was toxic to both species, particularly at the 3 kg/ha level (estimated 200 ppm residue level), as 43% of the 54 Village Weavers and 30% of the 40 queleas died; only 3% of the 41 queleas died at the 1 kg/ha rate. The mortalities indicate that low levels of methiocarb should be used and probably would be effective in repelling queleas and Masked Weavers. Methiocarb has been an effective, broad-spectrum, and nonlethal repellent to many bird pests in many countries (Guarino 1972, Crase & DeHaven 1976, Calvi *et al.* 1976).

Aerial application In October 1977, at Hawata (coord. 13°28'N x 34°38'E), an aerial application of 4 kg/ha of methiocarb, by a Piper Supercub with booms, with 1 kg/ha of an acrylic resin adhesive, Encryl E, on three plots of 4 ha each of sorghum did not provide protection because of application problems. Studies with birds put in enclosures in one of the aerially sprayed fields confirmed that the spray was ineffective in the manner applied. However, the same concentration, when applied to sorghum with a knapsack sprayer, resulted in good protection.

Table 1 Protection of ripening heads of dura sorghum in 8-m³ enclosures sprayed with methiocarb at Jodah, Upper Nile Province, Sudan; November 1978

Treatment rate (kg/ha)	No. birds per enclosure	Species	% damage*
3	54	Village weaver	1.4 ^a
3	40	Quelea	0.9 ^a
1	41	Quelea	2.6 ^a
Untreated	40	Quelea	42.6 ^b

* Significant difference ($P < 0.05$; t -test) occurred between damage percentages with different superscripts

Table 2 Crop damage and bird pressure in wheatfields treated with methiocarb in Kenya, Tanzania, and Sudan

Location		Untreated field	Treated field
Nanyuki, Kenya	No. damaged heads/1,000	493	60
	No. birds/observation		
	before treatment	612	1,278
	after treatment	629	182
Rujewa, Tanzania	No. damaged heads/1,000	510	50
	No. birds/observation		
	before treatment	65	32
	after treatment	174	39
Shambat, Sudan	Plot 1		
	No. damaged heads/1,000	116	31
	Avg no. birds/observation	54	3
	Plot 2		
	No. damaged heads/1,000	46	53
	Avg no. birds/observation	463	22

Table 3 Comparison of the effectiveness of complete and edge-only methiocarb applications to four varieties of ripening wheat at Shambat, Khartoum; February 1980

		Spray coverage			
		Complete		Edge	
	Replicates	% loss	Yield (kg/32 m ²)	% loss	Yield (kg/32 m ²)
Mex XG 155 L2 75/76	1	0	9.5	0	7.9
	2	8.0	9.7	5.0	8.1
Son 64 XC - 271	1	8.0	10.1	5.0	10.9
	2	10.0	9.3	0.0	9.6
Mex XG 155 L15 75/76	1	0	10.7	0	9.2
	2*	-	-	10.0	9.5
	3*	-	-	5.0	8.6
Average		3.7	9.8	3.6	9.1

* Only one complete-spray coverage plot

Table 4 Residues of methiocarb and its sulfoxide and sulfone metabolites (in ppm) from a 0.20% seed dressing treatment (by seed weight) of rice seed in Sudan, June 1980

Growth stage	Time (days)	Methiocarb	Methiocarb	Sulfoxide	Sulfone
Presowing	0	0.11%	-	-	-
Nongerminated	10	2	9 and 12	<1	<1
Seedlings	15	2	<1	<1	<2
Seedlings	20	3	1	<1	<2
Seedlings	25	<1	<1	<1	<1

Field tests Studies demonstrating the repellency of methiocarb to pest birds also were carried out on sorghum, millet, and wheat at ARC field stations at Shambat (coord. 15°35'N x 32°30'E), and Wad Medani (coord. 14°23'N x 33°32'E). Applications of 2% and 6% methiocarb sprays to individual heads of sorghum along one edge, and two days later the remaining edges of a 0.1 ha field, markedly reduced the number of birds feeding on the heads in the field during the first few days. Heads sprayed with either concentration were not eaten. Birds repelled included House Sparrows *Passer domesticus*, and weaver birds of the genera *Ploceus* and *Euplectes*. However, the technique did not protect the remainder of the field; birds soon began returning, and after one to two weeks, only the sprayed heads in the field were not completely eaten.

A similar application of 2% and 6% methiocarb on vulnerable heads of ripening millet resulted in a decrease in the number of *Ploceus* spp. feeding on the millet from about 300 birds to fewer than 50 the day after application. The bird population built up again following 6 mm of rain, which presumably washed off the methiocarb since no adhesive was used. Respraying the heads again reduced the numbers of *Ploceus* from several hundred to less than 50 birds a day.

Several additional methiocarb demonstrations were conducted in East Africa (De Grazio & DeHaven 1974). At Nanyuki (coord. 0°1'N x 37°7'E), Kenya, during January 1974, one of two 1/8 ha plots of ripening wheat was sprayed with methiocarb and a 0.5% latex adhesive solution at the rate of 3 kg/ha. Sixteen days after application, bird damage was eight times greater on the untreated than treated plot. Observations on and near the wheat plots before treatment indicated twice as many birds in the area to be treated than in the untreated area. Observations after treatment showed the reverse; about three times more birds in the untreated than in the treated plot (Table 2). Many birds had apparently left the area. Queleas, Chestnut Weavers *Ploceus rubiginosus*, and Long-tailed Whydah *Euplectes progne* were the most obvious pests.

Another demonstration was conducted at Rujewa (coord. 8°54'S x 33°27'E), Tanzania, in February 1974 on one of two 0.05 ha plots in a 1.2 ha field with the same application methods and rates as the previous test. After three days, bird damage was 10 times greater in the untreated than treated plot. Bird pressure also increased on the untreated plot compared to the treated plot (Table 2).

As a consequence of the encouraging results obtained in some of these preliminary tests, we decided in 1980 to determine the effectiveness of an edge spray in protecting an entire field (edge applications being more feasible economically than whole-field applications). In a trial at Shambat, Sudan, methiocarb was applied at the rate of 1 kg/ha to the outer edge (1/3 the area) of two 0.25 ha fields of ripening wheat during the milk stage and again 10 days later during the soft-dough stage. Two similar size fields were left untreated. Bird pressure and damage were monitored weekly. Each treated field was less damaged than its untreated pair, and from 18 to 20 times more birds were counted in the untreated than treated fields (Table 2).

In a second demonstration, also at Shambat during 1980, methiocarb was applied to experimental national wheat variety plantings. All heads in 11 of 70 32 m² plots (352 m² total) were individually sprayed with a total of 1.3 kg of methiocarb and 16 l of water; adhesive was not used. The edge rows of three other 32 m² plots also were sprayed to compare the effective-

ness of edge and complete coverage applications. Bird damage was estimated visually before spraying and just before harvesting. Effectiveness comparisons were made using yield and damage patterns of wheat grown at Shambat during the same period in the previous two years when methiocarb was not used. Bird counts were conducted before and after methiocarb was applied.

Methiocarb repelled House Sparrows, bishops, and *Ploceus* weavers; the number in the study plots decreased from an average of 73 per 10 min observation period during the three days before treatment to less than one bird per observation period during the two days immediately following application. Ten days later there were still less than two birds per observation period, on average. The reduced number of birds resulted in an average of only 2.9% loss in the 14 plots, compared with 5.6% in 12 plots in 1978/79 when methiocarb was not used.

Five varieties of wheat grown in 1979/80 also were planted in 1977/78 and 1978/79. Four of these varieties (Son 64 XC-271, Condor, Pato Argentina, Nayab 70) were less damaged in 1979/80 than in the two previous years. Finally, no significant differences ($P < 0.05$; t -test) occurred between the yields of edge-sprayed and completely sprayed plots (Table 3), again supporting the feasibility of the less expensive edge application methods.

Dabar variety sorghum is not an easy crop to protect because (a) it has small seeds (not unlike millet), (b) the grains do not protrude far from the glumes so that less chemical repellent is present on the surface areas of grains that queleas attack, (c) queleas attack it immediately after the flowering stage, (d) stands are sparse (ca 5,000 plants/ha), and (e) stands often ripen unevenly. This last situation makes a spot spray to the first ripening heads particularly appealing. For example, when the first 1% of the heads are in the dough stage and under bird attack while others are still in flower, these few maturing heads could be sprayed by villagers with a repellent.

Broadcast seed treatment

Methiocarb was effective in West Africa as a seed dressing for reducing bird losses to broadcast rice (Bruggers 1979). Farmers at the Gezira Scheme in Sudan sow their fields at rates of 77 to 110 kg/ha to compensate for various causes of nongeneration, including bird damage which can be so high that some fields have to be entirely resown. Using a bird repellent can provide a technique whereby farmers can sow at reduced rates and probably also eliminate the necessity to resow.

In the one seed dressing trial conducted in Sudan, the main birds eating the newly sown rice were Chestnut Sparrow Larks *Eremopterix leucotis* and Crested Larks *Galerida cristata*. They were part of a small resident population and averaged only 10-20 Sparrow Larks and 3-5 Crested Larks per day in the area; three-quarters of the visits were to untreated plots. No queleas or Golden Sparrows visited the fields, although both species were in the area during the study.

The proportion of damaged seeds was 3.8 times greater in the untreated plots than in the treated plots (averages of 16.9% and 4.4%). The rate of seedling survival, 17 per sampling unit in the treated and 15 per sampling unit in the untreated plots, was about the same due to displacement of seeds

during flooding, incidence of ungerminated seeds, and uneven distribution of seeds on and below soil. The trial demonstrated that methiocarb can reduce rice seed damage to larks; similar results were obtained in 1977 with these species in a trial on melon seeds in Senegal (Bruggers).

Residue analysis

Ripening grain: Residues averaging 74.6 ppm were found on heads of wheat (seed and glume) 10 days after treating with 3 kg/ha of methiocarb in Sudan. These are less than the 102 ppm found on sorghum in Senegal (seed and glume) for the same time period following a 2 kg/ha application (Gras *et al.* 1981). Residues on the seed itself would be expected to be even less than the 3.0 ppm found on sorghum after 25 days since the wheat seed is completely covered throughout maturation. More detailed chronological residue analyses are needed for ripening grains.

Broadcast seed: Seed and seedling samples for residue analysis of methiocarb and its sulfoxide and sulfone metabolites were obtained by randomly collecting at least 300 seeds or seedlings immediately after the chemical was applied and at days 10 (after irrigation), 15, 20, and 25 (when the plants were between 10 and 15 cm in height). The samples were immediately frozen and sent by air to the Denver Wildlife Research Center (DWRC) Chemical Research Laboratories. The samples were analyzed by the procedure of Greenhalgh *et al.* (1976). A portion of each sample was analyzed 'wet' as received at the laboratory. The rest of the samples were dried, analyzed, and corrected to the wet weight basis. The results are presented in Table 4. Methiocarb residues from the dried samples were all < 1 ppm after 15 days indicating no toxicity hazards. Differences of only 1-2 ppm were found between the wet and dry samples. The chemical already is registered in the U.S. for several fruit and grain crops at much higher levels of 15-25 ppm (Schafer 1979).

CONCLUSIONS

Our results indicate that late dough-stage sorghum (dura variety) can be protected initially at application rates as low as 1 kg/ha when sprays are directed only at the heads. This probably is near optimum effectiveness as the residue level at this concentration was computed to be about 65 ppm.

These results, supported by more detailed tests on the role of adhesives in Texas (Besser & Elias 1979), suggest that the acrylic resin, Rhoplex AC-33, when used at one part adhesive solids to three parts methiocarb solids, probably interferes with or masks the repellent properties of methiocarb. When adhesives are used in spray treatments in very dry climates, such as in Sudan, ratios of at least one part adhesive to 10 parts methiocarb should be used.

Although the results of these studies are encouraging, additional field-word testing, particularly with farmers, is necessary to further delineate the conditions under which methiocarb can be recommended as a crop protection method.

ACKNOWLEDGEMENTS

We are grateful for the logistical support and cooperation provided by the Sudan Government's Plant Protection Department (PPD) and Agricultural Research Corporation (ARC). G. Ghobrial, ARC Plant Physiologist and Rice Specialist coordinated the rice seed dressing trial. Residue analysis was completed by W. Okuno and A. Medbery, DWRC. Sadig Beshir, Salah Ali, Yousif Ahmed, Ahmed El Rahman, and Safi Mahadi, PPD, assisted in certain aspects of the work. The manuscript was reviewed by M. Fall. This research was conducted with funds provided to the U.S. Fish and Wildlife Service by the agency for International Development under the project "Control of Vertebrate Pests: Rats and Noxious Birds," PASA ID/TAB-473-1-67.

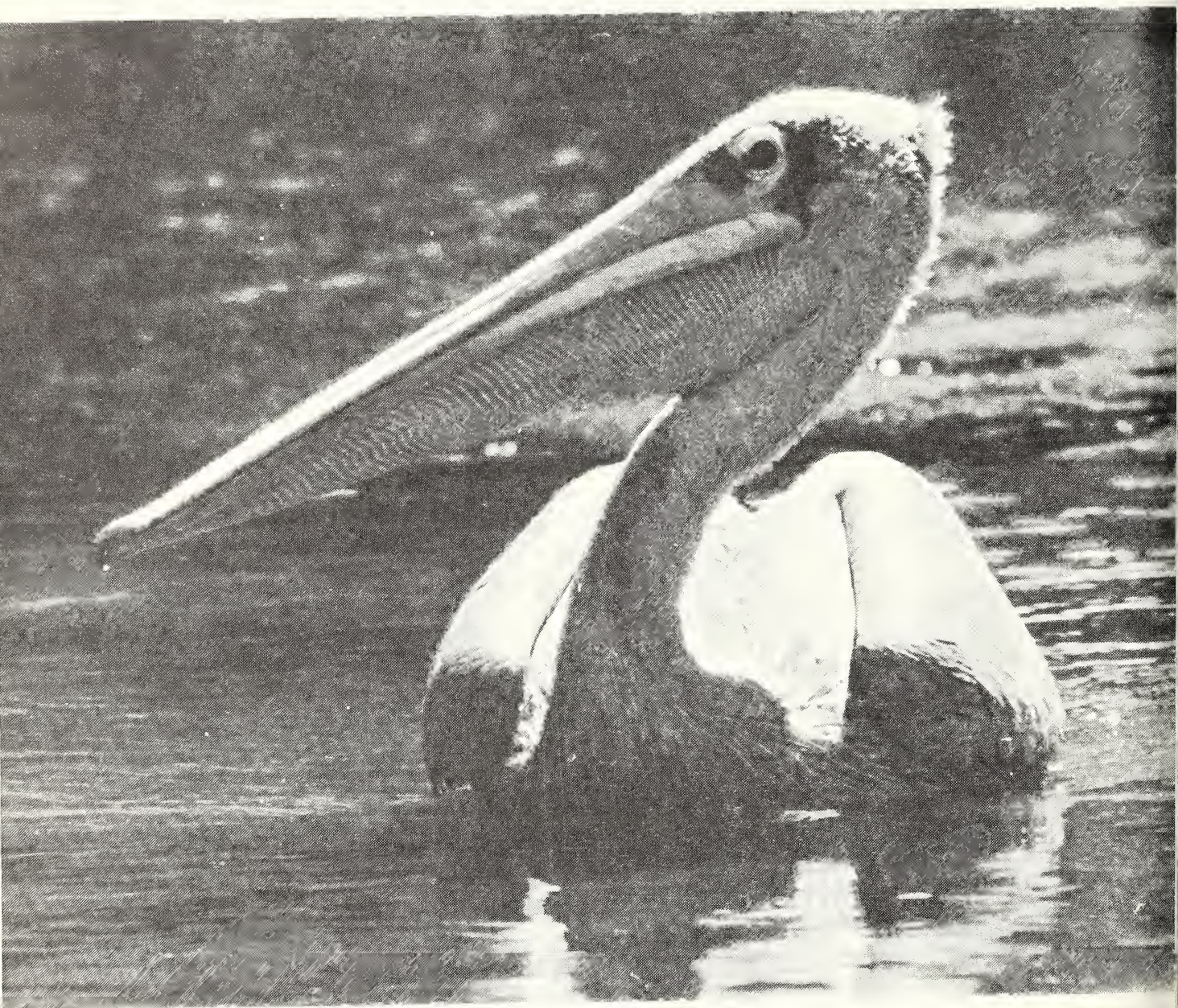
REFERENCES

- BESSER, J.R. & ELIAS, D.J. (1979) Methiocarb sprays for protecting grain sorghum from damage by house sparrows, Weslaco, Texas. Bird Damage Report No. 107. Projects 912 and 914. 6 pp
- BRUGGERS, R.L. (1979) Summary of methiocarb trials against pest birds in Senegal. *Proc. 8th Bird Control Semin.*, Bowling Green, Ohio, 8: 172-184
- BRUGGERS, R., MATEE, J., MISKELL, J., ERICKSON, W., JAEGER, M., JACKSON, W.B. & JUIMALE, Y. (1981) Reduction of bird damage to field crops in eastern Africa with methiocarb. *Trop. Pest Manage.* 27: 230-241
- CALVI, C., BESSER, J., DE GRAZIO, J.W. & MOTT, D.F. (1976) Protecting Uruguayan crops from bird damage with methiocarb and 4-aminopyridine. *Proc. 7th Bird Control Semin.*, Bowling Green, Ohio, 7: 255-258
- CRASE, F.T. & DEHAVEN, R.W. (1976) Methiocarb: its current status as a bird repellent. *Proc. 7th Vertebr. Pest Conf.*, Monterey, California, 7: 46-50
- DE GRAZIO, J.W. (1978) World bird damage problems. *Proc. 8th Vertebr. Pest Conf.*, Sacramento, California, 8: 9-24
- DE GRAZIO, J.W. & DEHAVEN, R.W. (1974) Vertebrate damage control research --quelea bird problems in African agriculture. USAID/USFWS Denver Wildlife Research Center, International Programs Annual Report. 28 pp
- GRAS, G., HASSELMAN, C., PELLISIER, C. & BRUGGERS, R. (1981) Residue analysis of methiocarb applied to ripening sorghum as a bird repellent in Senegal. *Bull. Environ. Contam. Toxicol.* 26: 393-400
- GREENHALGH, R., MARSHALL, W.D. & KING, R.R. (1976) Trifluoroacetylation of Mesurol [4-Methylthio-3,5 xylyl-N-methylcarbamate], its sulfoxide, sulfone, and phenol analogs for analysis by gas chromatography. *J. Agric. Food Chem.* 24: 266-270
- GUARINO, J.L. (1972) Methiocarb, a chemical repellent: a review of its effectiveness on crops. *Proc. 5th Vertebr. Pest Conf.*, Fresno, California, 5: 108-111
- MAGOR, J. (1974) Quelling the quelea--bird plague of Africa. *Spectrum* 118: 8-11
- MARTIN, L. (1976) Tests of bird damage control measures in Sudan, 1975. *Proc. 7th Bird Control Semin.*, Bowling Green, Ohio, 7: 259-266

- MARTIN, L.R. & JACKSON, J.J. (1977) Field testing a bird repellent chemical on cereal crops. *Vertebrate Pest Control and Management Materials, ASTM STP 680*, R. E. Marsh, ed., American Society for Testing and Materials, pp. 177-185
- ROGERS, J.G., JR. (1974) Responses of caged red-winged blackbirds to two types of repellents. *J. Wildl. Manage.* 38: 418-423
- ROGERS, J.G., JR. (1978) Some characteristics of conditioned aversion in red-winged blackbirds. *Auk* 95: 362-369
- SCHAFER, E.W., JR. (1979) Registered bird damage control chemicals. *Pest Control* (June), pp. 36-39
- SHEFTE, N., BRUGGERS, R.L. & SCHAFER, E.W., JR. (1982) Repellency and toxicity of three bird control chemicals to four species of African grain-eating birds. *J. Wildl. Manage.* 46(2):
- SHUMAKE, S.A., GADDIS, S.E. & SCHAFER, E.W., JR. (1976) Behavioral response of quelea to methiocarb (Mesurol^R). *Proc. 7th Bird Control Semin.*, Bowling Green, Ohio, 7: 250-254

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Pink-backed Pelican *Pelecanus rufescens*, Nigeria. Photo: Philip Blasdale

BREEDING OF BLACK-HEADED BEE-EATERS IN NIGERIA

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Received 12 March 1982

The Black-headed Bee-eater *Merops (Bombylonax) breweri* is one of the least known members of its family. No nest has previously been reported, nor field notes published other than by Chapin (1939). West of the Congo basin the species has been discovered at only two locations. In Ghana a pair and a singleton a few km away were seen in 1952 near Mankrong on the Affram River at 06°41'N 00°19'W, an area now inundated by Lake Volta (M. J. Horwood, pers. comm. to C.H.F.). In Nigeria one was collected in Mamu Forest (06°10'N 07°10'E) in 1953 and another, undated, nearby at Idah (07°07'N 06°45'E) on the lower Niger (Elgood 1982).

Black-headed Bee-eaters were re-discovered in this same region of southern Nigeria in January 1980 by J.A.H. (Hendrick 1980), as noticed with an accompanying photograph in *Malimbus* 3 (1981): 51. A pair, later with a third adult which may have been a helper as in several other species of *Merops* (Fry, in press), was found at a nest burrow near Ugbabo (07°24'N 07°00'E) and in 1981 J.A.H. found a nest at Alade (07°21'N 07°11'E) and two more at Elubi (07°35'N 07°26'E). The five Nigerian localities embrace an area of less than 25 x 100 km, centred on the Igalaland plateau at 300-350 m altitude, over 850 km from the closest point (Gabon) in the main range of the species in the Congo basin.

Activity at the 1980 nest was studied by Hendrick (1980) and M.D. and the Elubi nests were watched by M.D. and J.A.H. and kept under continuous observation by C.H.F. in a hide from 23 to 26 March. The following account supplements that of Hendrick (*loc. cit.*).

Habitat

Igalaland is a mosaic of farmland, Oil-Palm *Elaeis guineensis* forest and immature forest with patches of disturbed mature forest rooted in dystric nitrosols and orthic acrisols (Anon 1980). Forest with continuous canopy is generally absent in the area, and the appearance of the habitat is that of forest/savanna ecotone. Patches of cultivation are fringed with the tall annual weed *Eupatorium odoratum*. *M. breweri* inhabits degraded palm forest (Dawtreay 1979) characterized by Oil-Palm plantations with scattered stands of forest dominated by *Chlorophora excelsor*, *Albizia adianthifolia* and *Irvingia gabonensis*. The birds foraged in open secondary growth around cultivated fields, and in plantations, thickets and disturbed woods. Nest burrows were in a heap of soft lateritic soil dumped from a roadside drainage ditch; roadside banks of hard sand and compacted sandy laterite; and a hoed sandy-loam field cleared of vegetation except for scattered cassava shrubs and a number of tall dead trees, surrounded by much-disturbed woods.

Foraging Behaviour

Hunting was mainly from low perches, within 4 m of the ground, either a thin horizontal limb over the roadside or other place with fairly open airspace, or inside a thicket with very restricted room for manoeuvre. From the former perches prey-capture was typically meropid in execution, a short, quite rapid, gliding flight declining towards airborne prey, which was taken back to the perch for vigorous beating. In pursuit of prey the very round wings of this species make it look unlike the pointed-winged savanna bee-eaters. In restricted airspace *M. breweri* had a more flapping, less sailing pursuit flight, with short adroit chases through the vegetation. Most prey was airborne, but one bird at the Ugbabo nest sometimes hunted like a drongo, swooping down to snatch an insect from vegetation a few cm above ground level.

Food

Items taken into nests were mainly hawkmoths and cicadas, with fewer butterflies and beetles (and possibly grubs). Nest litter included carpenter-bees *Xylocopa* sp. and cetoniine beetles *Plaesiorrhina recurva* in abundance, also worker Honeybees *Apis mellifera*, wasps *Belanogaster* sp. (Vespidae), *Chlorion maxillosum* and *Philanthus* sp. (Sphecidae) and ruteline beetles (M. Walters pers. comm. to J.A.H.). 66 insects identified from pellet remains in another nest comprised 16 worker Honey-bees, 10 other Apidae of 10 species, 2 *Philanthus* and 4 other sphecids, 1 pompilid wasp, 17 vespids of five species, 3 alate ants, 1 acridid grasshopper, 1 cicada, and 11 beetles of five species I (including cetoniines and coprines) (det. C.H.F.).

Attendance at Nests

The disparity in size of the two eggs photographed by Hendrick (1980) strongly suggests that one was a honeyguide's; if this nest had been parasitized that might be the reason for its failure soon after the evident hatching (and disappearance) of a third egg. The Alade nest was deserted after one of the birds had been caught by a boy and kept in captivity until it died (the specimen was obtained and presented to the British Museum); the Elubi nests both held young nestlings when discovered. On 24 March three nestlings were extracted from one nest (and returned there after examination, when adults immediately resumed feeding them) - they were about 10-14 days old and weighed 34, 40 and 43 g. The dead, starved adult weighed 41.5 g and an adult netted on 26 March was 54 g.

The three adults at the Ugbabo nest often perched together above the burrow but because of its location in a road-cut, the frequent passage of vehicles and pedestrians prevented them from feeding the young regularly. Although it was suspected that all three were entering the nest with food, it could not be ascertained that the third bird was definitely a helper.

Each Elubi nest was attended by its parents only; evidently neither pair had a helper. All four were individually identifiable by streamer length (which was 83 mm longer than the tail in the bird netted), and none of them entered the other nest despite its proximity, only 7 m away on the opposite side of a metalled minor road. Some motor traffic, and considerable foot traffic on market days, did not disturb them unduly and the nest feeding rate between 0800 and 1700 h averaged 6/h.

ACKNOWLEDGEMENTS

We wish to thank M. E. Bacchus, G. R. Else, O. W. Richards and C. T. Vardy for the identification of insects, M. Walters for his good offices at the British Museum, and M. J. Horwood for his helpful correspondence.

REFERENCES

- ANON (1980) *The Regional Plan Atlas of Benue State*. Min. Economic Planning, Lagos
- CHAPIN, J.P. (1939) The Birds of the Belgian Congo. Vol. 2. *Bull. Amer. Mus. Nat. Hist.* 75: 1-632
- DAWTREY, B. (1979) The influence of farming and fire on the vegetation of Igalaland. *Elaeis* 1: 43-54
- ELGOOD, J.H. (1982) *The Birds of Nigeria*. British Ornithologists' Union, London
- FRY, C.H. (in press) *The Bee-eaters: Evolutionary Biology of the Meropidae*. T. & A. D. Poyser, Calton
- HENDRICK, J. (1980) 'That bird' *Bombylonax greweri* (sic) (Cassin). *Elaeis* 2: 63-66
- M. Dyer, Canadian Wildlife Service, Revelstoke, British Columbia VOE 2S0, Canada
- C. H. Fry, Aberdeen University Zoology Dept., Tillydrone Avenue, Aberdeen AB9 2TN, Scotland
- J. A. Hendrick, Ayangba c/o P.M.B. 2178 Kaduna, Nigeria

ADDITIONS TO LOCAL AVIFAUNAS: ZARIA - The following birds new to the Zaria area have been reported since the additions made by Dyer (*Bull. Niger. Orn. Soc.* 13, 1977, 82-83). Observers: M.D. - M. Dyer, M.E.G. - M. E. Gartshore, A.U.E. - A. U. Ezealor, C.R. - C. Ryall, H.Q.P.C. - H. Q. P. Crick.

Glossy Ibis *Plegadis falcinellus* About 20 over University Farm Lake in early April, 1981 (M.D., M.E.G.).

Wigeon *Anas penelope* A female feeding with Garganey *A. querquedula* at University Farm Lake, 10-12 April 1981 (M.D., M.E.G., H.F.C.).

Booted Eagle *Hieraaetus pennatus* One over experimental plots near Bomo Lake, Samaru, Zaria, on 31 January 1981 (M.D., M.E.G., A.U.E.).

Long-legged Buzzard *Buteo rufinus* Observed at the same time as the above, this distinctive raptor circled over fields and alighted, allowing very close approach (M.D., M.E.G., A.U.E.).

Scaly Francolin *Fringillus squamatus* A pair heard duetting at about 0800 hrs., 5 August 1981 in dense savanna woodland adjacent to gallery forest at Anara For. Res. 5 August 1981. This observation represents a substantial range extension north in Nigerian savannas. (It is common at Nindam For. Res. near Kafanchan and Kagoro (M.E.G., C.R.)).

Finfoot *Podica senegalensis* An immature bird was purchased from fisherman at Kubanni reservoir in February 1979. It was later released at University Farm Lake (M.D., M.E.G.).

Kittlitz's Sandplover *Charadrius pecuarius* Six feeding on shore of Kubanni reservoir in early April 1981 (M.D.).

Avocet *Recurvirostra avosetta* Two in winter plumage on Kubanni reservoir, late March 1981 (M.D., M.E.G.).

Black-headed Gull *Larus ridibundus* Its inland status in West Africa has changed in recent years (Sharland *Malimbus* 3, 1981, 54) and it is now a frequent visitor to Zaria reservoirs in the dry season (M.E.G., M.D.).

Black Tern *Sterna nigra* One with a White-winged Tern *S. leucoptera* at Samaru sewage works in early April 1981 (distinguished by marginally smaller size, darker colouration, dark pectoral area and greyish tail) (M.E.G.).

Yellowbill *Ceuthmochanes aereus* Observed on several occasions in gallery forest at Anara Forest Reserve; also at Old Birnin Gwarri (just outside the Zaria area) (M.D., M.E.G.).

Narina Trogon *Apaloderma narina* At least three observed throughout the wet season in dense gallery forest at Anara Forest Reserve (M.E.G., A.U.E., C.R.).

Yellow-bellied Bunting *Emberiza flaviventris* A pair in August 1981, the male singing (M.E.G.).

Melba Finch *Pytilia melba* Seen on several occasions from August, 1979 to August 1981 at Samaru also in June 1980. This species is normally associated with Sudan savanna and may be shifting southward in response to

changes wrought by more intensive cultivation (M.D., M.E.G.).

Black-bellied See cracker *Pirenestes ostrinus* Reported by Hartert (Novit. Zool. 22, 1915, 244-266) as a breeding resident near Kaduna, its presence at Zaria has never been substantiated. Several were observed in tall grass in a fadama area at Anara Forest Reserve in September 1980 (M.D., H.Q.P.C.).

M. E. Gartshore

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DESTRUCTION OF EUROPEAN WHITE STORKS IN NIGERIA BY SHOOTING - Even more noteworthy that the number of Spanish-ringed White Storks *Ciconia ciconia* recovered in Nigeria in the last two years - eight - is their fate there. One was caught and released alive with its original ring; the other seven were shot. Details are:

- C 15540 Ringed 07/06/1977 (pullus), Miajadas, Cáceres, Spain 39°09'N 05°54'W
-/12/1890, Nguru, Nigeria 12°53'N 10°30'E Shot
- C 14334 26/05/1978 (pullus), El Gordo, Cáceres, 39°52'N 05°20'W
-/01/1980, Gashua, Nigeria 12°53'N 11°05'E Released alive
- C 11390 26/05/1978 (pullus), Elmaraz, Spain 39°50'N 05°37'W
-/12/1980, Nguru Shot
- C 18943 27/05/1978 (pullus), El Gordo
19/01/1980 Kano 12°55'N 10°30'E Nigeria Shot
- C 18823 05/06/1979 (pullus) Brozas, Cáceres 39°37'N 06°47'W
-/12/1981, Nguru Shot
- G 01351 06/06/1980 (pullus), Muñana, Avila, Spain 40°35'N 05°03'W
-/12/1981, Nguru Shot
- G 03338 04/06/1981 (pullus), Casas Viejas, Cadiz, Spain 36°21'N 05°49'W
-/12/1981, Nguru Shot
- G 03491 06/06/1981 (pullus), Casas Viejas, Cadiz
-/12/1981, Nguru Shot

All of the indications are that the Iberian/Maghreb population of White Storks, separated from the larger east European population by an ever-increasing distance, is in a state of decline (S. Cramp *The Birds of the Western Palearctic*, 1977. See p. 329 and map p. 331). Doubtless the principal cause is drainage of European wetlands, but unnecessary persecution in African winter quarters cannot help. 17 other White Storks have been recovered in Nigeria since 1964 (R. E. Sharland, Ringing in Nigeria ... Annual Reports Nos. 9, 10, 11, 13, 14, 15-16, 17, 21 and 23, *Bull. Niger. Orn. Soc. and Malimbus*), ringed in Spain (6), Tunisia (3), Morocco (1), Algeria (1), France (2), Germany (3) and Greece (1); two of them were recovered at Azare (39°37'N 22°16'E) (one "killed" and the other "caught by trapper and later released"), one at Biu (10°36'N 12°11'E), and the remaining 14 at Nguru. The fate of the Nguru 14 has not been given but it is safe to assume that they were all or nearly all caught alive by trappers for the well-known Kano live-bird trade. Presumably that trade continues unabated (R. E. Sharland, pers. comm.), with illegal destruction by shooting a new hazard and an additional burden for the wintering White Stork population to bear.

BRONZE MANNIKINS 'FLYCATCHING' - On the morning of 8 May 1979 a light drizzle was falling, the end of a rainstorm which had lasted all night. The rain had brought out large numbers of flying insects, mainly termites. From branches on a small tree near Obudu, Nigeria, about half a dozen Bronze Mannikins *Lonchura cucullata* were flying out a short distance, catching insects in the air, and returning to their perch in a manner more typical of flycatchers. Fairly frequently they would miss the insect at the first attempt and would hover briefly before seizing it at the second or third try. This species feeds principally on grass seeds, and although Bannerman (1953) notes that they may flock to a termite swarm and seize the insects amongst the grass, he gives no indication of this flycatcher-like behaviour.

A. M. Heaton

Sevenoaks Wildfowl Reserve, Sevenoaks, Kent TN13 3DH, U.K.

Note: 'Flycatching' from termites and ants is common in a variety of unexpected birds (J. M. Thiollay, Alauda 38, 1970, 255-273) but the behaviour has hardly been described in detail for any of them. Editor.

OUT-OF-SEASON COURTSHIP BY BLACK-FACED FIRE-FINCH - On 9 February 1979 I observed a pair of Black-faced Fire-finches *Estrilda larvata* chasing each other around a piece of scrubland near Obudu, Nigeria. When they settled close together on a branch it was apparent that the male had a blade of grass in its beak, holding it over its head like an umbrella. It hopped sideways along the branch up to the female and away again; it repeated this a couple of times before they flew off and I lost sight of them. This would appear to be a form of courtship behaviour, and recalls similar behaviour seen at Lama-Kara, Togo, by Cheke & Walsh (*Malimbus* 2: 118); however, Mackworth-Praed and Grant (1970-73) give the breeding season for *E. larvata* as July and August, well after the date of my observation.

A. M. Heaton

Sevenoaks Wildfowl Reserve, Sevenoaks, Kent TN13 3DH, U.K.

THE STATUS OF SAVI'S WARBLER IN NIGERIA - In his excellent check list of the birds of Nigeria Elgood (1982) lists Savi's Warbler *Locustella luscinioides* as a 'vagrant palaearctic migrant', qualifying it with 'possibly vagrant' in the text. To northern Nigeria we consider that it is not a vagrant but a regular migrant. In support of that we note that a total of at least 13 Savi's Warblers have now been netted in Nigeria including six at one locality, Jakara Dam (12°40'N 8°10'E) near Kano, in the short period November 1981-February 1982. One of these, collected on 22 November 1981 (BM No. 1981 - 11 - 1), was in advanced primary moult suggesting that it was at least temporarily resident; three were collected in December and one in early February, all from dense *Typha* beds surrounding the dam. We believe that the low number of Savi's Warblers previously reported in Nigeria may reflect the earlier concentration of mist-netting activity in the periods of autumn and spring passage; our birds were all netted in the intervening period.

R. Wilkinson and D. J. Aidley

Dept. Biological Sci., Bayero University, P.M.B. 3011, Kano. Nigeria

A COLOUR VARIANT OF *SPREO PULCHER* AT KANO, NIGERIA - During the course of an intensive study of the biology of the Chestnut-bellied starling *Spreo pulcher* at Kano I observed a number of very pale coloured individuals which are described below. The normal plumages of adult and juvenile Chestnut-bellied Starlings are fully described by Bannerman (1948) and I am familiar with these. In adult plumage the pale variant differs from the normal in that those feathers which are normally dark glossy green are instead a dirty fawn glossed with silver, the normally dark brown areas of the remiges are diluted to a dull steel grey (and show considerably more evidence of wear than in normal plumage) and the belly is a pale cinnamon-orange rather than chestnut. Such pale variants are not represented in the skin collection of the British Museum (Natural History) and to my knowledge have not previously been recorded.

One pale variant was observed at the Agricultural Department Farm, some 8 kilometres east of Bayero University, but all other sightings were of starlings on the University campus. In January 1980 at least four of the pale birds, all of which belonged to the same social group, whose focal area centred around the staff school, were present on the campus. The Chestnut-bellied Starling is a cooperative breeder with birds other than the parents helping to feed the nestlings (Wilkinson *Bull. Niger. Orn. Soc.* 14, 1978, 71-72) and at least three pale variants and four normal plumaged birds were associated with one nest of this group in April 1980. A single nestling which had been colour-ringed at a different nest of the same social group in October 1979 proved to be a pale variant which in juvenile plumage was already recognisable by its generally pale colouration. The percentage of this nestling was unknown but a nest in the same bush in June 1980, where both parents were of normal colouration, produced a mixed brood of pale and normal coloured chicks. Of three birds known to fledge from this brood of five nestlings, two were of normal plumage and one a pale variant. No pale variants fledged from nests of this group in 1981 and by July 1981 all pale birds had disappeared from the study area.

R. Wilkinson

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SPANISH BLACK KITES IN WEST AFRICA - Recent notification of ringing and recovery data indicates that some Black Kites *Milvus migrans* reared in Spain evidently winter as far east in West Africa as Ghana. Details are:

- DE 08949 14/06/1972 (pullus), Reserva Biológica Doñana, Spain 37°02'N 03°27'W
-/11/1973, Agbenohoe, Ghana 07°00'N 00°25'E (road casualty)
- MD 14782 22/06/1977 (pullus), Pescueza, Cáceres, Spain 39°54'N 06°39'W
07/12/1977, Bolgatanga, Ghana 10°44'N 00°53'W (caught alive)
- MD 12641 25/06/1977 (pullus), Nava del Rey, Valladolid, Spain 41°19'N 05°05'W
15/01/1979, Tamale, Ghana 09°26'N 00°49'W (shot)

C. H. Fry

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THE BIRDS OF NIGERIA by J. H. Elgood. Checklist No. 4, British Ornithologists' Union, London, January 1982, pp. 246. Price £14 (£10 to B.O.U. members).

In 1964 J. H. Elgood produced a provisional checklist of Nigerian birds (*Bull. Niger. Orn. Soc.* 1, 13-25) which later became the basis of two privately-circulated lists (Parker 1970 and Heigham 1975), each with its own species additions and omissions, and nomenclatural and taxonomic preferences. With the publication of *The Birds of Nigeria* ornithologists have at last a standardised reference list of Nigerian birds.

The previous lists were just that - lists. But this work offers far more: a comprehensive and invaluable summary of the Nigerian ornithological scene, past and present. The first 50 pages cover topography, climate and vegetation of Nigeria; migration (Palearctic and intra-African); breeding seasons, population trends and conservation. I regard this section as one of the volume's highlights and it should prove indispensable to anyone wishing to know, in a nutshell, the relationship of the country's avifauna to its environment.

The species treated in the annotated systematic list include all those recorded up until the end of 1980, a total of 838. The author has followed White's (1960-1965) taxonomy, but one wishes that he had offered some opinions on certain taxonomic inconsistencies, such as the inclusion of the Black-faced Fire-finch in *Estrilda* rather than *Lagonosticta*. Each species receives up to ten lines of comment, indicating its relative abundance, general habitat preference, distribution, migratory behaviour and breeding status. With such a large number of species to deal with, errors and omissions are surprisingly few. One glaring omission, however, the the Grey-headed Gull *Larus cirrocephalus* which, oddly enough, is mentioned in the paragraph on the Black-headed Gull (p. 93). It is easy to find errors in distribution amongst species with which one is familiar, and one cannot fault the author if he has not been kept informed. All the same I would like to set the record straight on two species reported for Kagoro. In April 1977, John Elgood and I heard a bird in the forest there that was unfamiliar to me but sounded familiar to him; he believed it was a Red-cheeked Wattle-eye *Platysteira blissetti*. After many hours of netting, and finally watching it singing, it turned out to be an Olive Green Camaroptera *Camaroptera chloronota*. Likewise a call I assumed was of the Red-sided Broadbill *Smithornis rufolateralis* proved to be the territorial 'song' of the Spotted Honeyguide *Indicator maculatus*. The wattle-eye and broadbill are noted in *The Birds of Nigeria* to occur at Kagoro, and I accept full responsibility for those errors since I did not inform the author of my subsequent discoveries.

This book is a must for anyone interested in Nigerian ornithology, and all of us who have yet unpublished notes on Nigerian bird distribution and breeding records must surely be stimulated by it to get our observations into print.

It appears at a time when, because of intense human population pressure, the natural vegetation of Nigeria is undergoing disastrous and irreversible changes. How these changes will affect the avifauna is still open to question, but the future of many forest species is bleak. *The Birds of Nigeria* is not just an annotated checklist, but an historical document whose ornithological value must increase with every Nigerian tree felled.

La Direction des Parcs Nationaux (BP 5135 Dakar - Sénégal) porte à la connaissance de tous les ornithologues que 55 Pélicans blancs sub-adultes ont été bagués au Parc National des Oiseaux du Djoudj le 29 janvier 1982. Les bagues sont soit en Darvic de couleur jaune (BIRO) n° s 002 à 095, soit en aluminium orange n° s S.A. 420 - 34 - 38 - 40 - 63 - 66 - 69. En cas de reprise ou d'observation, prière d'écrire à l'adresse susmentionnée.

55 pelicans in the Djoudj National Park in Senegal have been ringed with yellow Darvic rings numbered 002 to 095 and orange aluminium rings S.A. 420 - 34 - 38 - 40 - 63 - 66 - 69. Please report any sightings to: La Direction des Parcs Nationaux, BP 5135, Dakar.

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The Witwatersrand Bird Club, a branch of the Southern African Ornithological Society, is holding a symposium on BIRDS AND MAN in Johannesburg from 10 to 15 April 1983. Internationally renowned speakers have been invited and the following sessions are envisaged:

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 Indigenous Birds in Cities
- 12 April Indigenous Birds and Exotic Plants
 Exotic Birds and Indigenous Plants
- 13 April Birds and Manmade Lakes
 Miscellaneous - Bird/Man Interactions

Excursions are planned for 14 and 15 April. For information pamphlet please write to the Symposium Secretary, PO Box 72091, Parkview, Johannesburg, 2122.

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BANNERMAN 1930-51 or 1953 : Bannerman, D.A. (1930-51) *The Birds of West Tropical Africa*. 8 vols. Crown Agents, London; ----- (1953) *The Birds of West and Equatorial Africa*. 2 vols. Oliver and Boyd, Edinburgh and London

ELGOOD 1982 : Elgood, J.H. (1982) *The Birds of Nigeria*. B.O.U., London

ELGOOD, SHARLAND & WARD 1966 : Elgood, J.H., Sharland, R.E. & Ward, P. (1966) Palaearctic migrants in Nigeria. *Ibis* 108 : 84-116

ELGOOD, FRY & DOWSETT 1973 : Elgood, J.H., Fry, C.H. & Dowsett, R.J. African migrants in Nigeria. *Ibis* 115 : 1-45 and 375-411

HALL & MOREAU 1970 : Hall, B.P. & Moreau, R.E. (1970) *An Atlas of Speciation in African Passerine Birds*. British Museum (Nat. Hist.), London

MACKWORTH-PRAED & GRANT 1957-73 or 1970-73 : Mackworth-Praed, C.W. & Grant, C.H.B. (1957-73) *African Handbook of Birds*. Series I, Birds of Eastern and North Eastern Africa (2nd ed.). 2 vols. Series II, Birds of the Southern Third Africa. 2 vols. Series III, Birds of West Central and Western Africa. 2 vols. Longmans Green & Co., London; ----- (1970-73) *African Handbook of Birds*. Series III, Birds of West Central and Western Africa. Vol. I, 1970, Non-passerines, Vol. 2, 1973, Passerines. Longmans, London

SERLE & MOREL 1977 : Serle, W. & Morel, G.J. (1977) *A Field Guide to the Birds of West Africa*. Collins, London

SNOW, D.W. (Ed.) 1978 : *An Atlas of Speciation in African Non-Passerine Birds*. British Museum (Nat. Hist.), London

WHITE 1960-65 : White, C.M.N. (1960) A check list of the Ethiopian Muscicapidae (Sylviinae) Part I Occasional papers of the National Museums of Southern Rhodesia 3 (24B) : 399-430; (1961) A revised check list of African broadbills ... etc. Lusaka : Government Printer; (1962a) A check list of the Ethiopian Muscicapidae (Sylviinae) Parts II and III. Occ. Pap. Nat. Mus. S. Rhod. 3 (26B) : 653-738; (1962b) A revised check list of African shrikes ... etc. Lusaka : Gov. Printer; (1963) A revised check list of African flycatchers ... etc. Lusaka : Gov. Printer; and (1965) *A revised check list of African Non-Passerine birds*. Lusaka : Gov. Printer.

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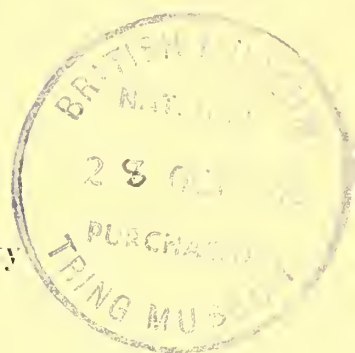
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Journal of the West African Ornithological Society

Société d'Ornithologie de l'Ouest Africain



VOLUME **4** 1982

Number 2, October

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Malimbus

Vol. 4 1982 No. 2, October

SEASONAL MOVEMENTS OF THE PYGMY KINGFISHER *CEYX PICTA* IN WEST AFRICA

by Roger Wilkinson

Received 11 August 1982

In a recent paper on bird migration in southern Africa, Benson (1982) contrasts the regular seasonal migration of the Pygmy Kingfisher *Ceyx picta* south of the equator with its apparent sedentary nature in the northern tropics. Elgood, Fry & Dowsett (1973) could find little evidence for migration of *C. picta* within Nigeria, although with more recent evidence Elgood (1982) notes seasonal movements in some areas of the extreme north.

The purposes of this paper are to demonstrate that seasonal migration in *C. picta* is widespread over the northern savannas of West Africa, and to emphasize the continuing need for information on the seasonal occurrence of birds in many localities in West Africa.

SEASONAL OCCURRENCE

Recently published information on seasonal occurrence of *C. picta* at various West African localities is summarized in Table 1, where the localities are listed in sequence of rising latitude. The data have been culled almost exclusively from papers in *Bull. Nigerian Orn. Soc./Malimbus*. Table I suggests that, in the terminology of Elgood et al. (1973), *C. picta* is a 'southern concertina' migrant extending northwards for the rainy season and withdrawing south again for the dry season. South of 9°N the species is present throughout the year, whereas north of 13°N (and extending to at least 16°25'N in Senegal) it occurs only during the rainy season. At intermediate latitudes it is either present all year (e.g. Pendjari and Arli Nat. Parks), or is a partial migrant (e.g. Mole Nat. Park), or is totally absent in the dry season (e.g. Kano); what happens probably depends more on local conditions, like rainfall distribution and extent of kurmi woodlands, than on the precise latitude.

Table 1 overleaf
Text cont. p. 108

Table 1 Seasonal occurrence of *Ceyx picta* in West Africa

Habitat: Fe - Forest edge, H - Human and Urban, K - Kurmi, gallery forest, R - Riparian, S - Savanna, Sc - Scrub,
P - Plantation, U - Ubiquitous

Locality	Co-ordinates	Months recorded	Habitat and Comments	Reference
Calabar, Nigeria	04°58'N 08°17'E	All months	Sc, P, Fe, Resident	BNOS=Bull. Nigerian Orn. Soc.
Mid-west Nigeria	05°54'N 05°42'E	All months	S, H, P, Resident	Mackenzie 1979 Malimbus 1: 47
Lagos, Nigeria	06°28'N 03°25'E	Jan-May, Jul, Aug, Nov	Resident?	Heigham 1976 BNOS 3(12): 76
Ile-Ife, Nigeria	07°29'N 04°33'E	Oct	Coverage only for Sep-Feb	Gee & Heigham 1977 BNOS 13: 103
Serti, Nigeria	07°30'N 11°22'E	Sep-Jan	Coverage only for Sep-Jan	Farmer 1979 Malimbus 1: 56
Mole, Ghana	09°16'N 01°15'W	'Resident'	R, S, H	Hall 1977 BNOS 4(13): 66
Mole, Ghana	09°16'N 01°15'W	'Wet season', but single recorded in Jan	Partial migrant?	Greig-Smith 1976 BNOS 4(12): 49
Mole, Ghana	09°16'N 01°15'W	Jan		Taylor & Macdonald 1978 BNOS 4(14): 80
Yankari, Nigeria	09°38'N 10°25'E	Apr-Jan	U, Absent or less abundant in late dry season?	Crick & Marshall 1981 Malimbus 3: 103
North & Central Borgu, Nigeria	10°00'N 04°40'E	Jan-Nov	K, R, Resident?	Wells & Walsh 1969 BNOS 6(21): 1
Naboulgou, Togo	10°10'N 00°45'E	Jul	Coverage mostly in wet season	Cheke & Walsh 1980 Malimbus 2: 112
Yelwa, Nigeria	10°52'N 04°40'E	Dec	K, Coverage only for Oct-Dec	Hall 1976 BNOS 3(12): 67
Falgore, Nigeria	11°00'N 08°42'E	May, Jul	R, S, wet season	R. Wilkinson (unpubl.)
Pendjari & Arli N.P.s, Benin & Upper Volta	11°35'N 01°28'E	'Present all year'	R, S, Resident	Green & Sayer 1979 Malimbus 2: 14
Potiskum, Nigeria	11°45'N 11°02'E	'Commonest at start & end of dry season'	Augmented by birds on passage?	Elgood 1982
Maiduguri, Nigeria	11°49'N 13°09'E	Jun-Oct	S, R, wet season	Hall 1977-BNOS 4(13): 15
Kanc, Nigeria	12°00'N 08°30'E	Jul-Oct; also recently May, Jun	S, H, wet season	Sharland & Wilkinson 1981
Sokoto, Nigeria	13°02'N 05°16'E	'Odd times of the year', only Jun & Aug noted specifically	Malimbus 3: 7	D.J. Aidley (pers. comm.)
Quadi Enne, Chad	13°30'N 20°30'E	'Wet season', (Jul-Sep?) earliest 29 Jun	Authors consider <i>C. picta</i> 'probably resident'	Mundy & Cook 1972-BNOS 3(9): 26
Quadi Zornam, Chad	14°07'N 19°06'E		R? Wet season	Newby 1980-Malimbus 2: 29
Malamfatori, Nigeria	13°37'N 13°23'E	Jul-Sep	Wet season	Elgood 1982
Bani, Mali	14°30'N 04°12'W	Aug, Sep	R, S, wet season	Lamarche 1980-Malimbus 2: 121
Gossi, Mali	15°48'N 01°19'W	Aug		
Richard Toll, Senegal	16°25'N 15°42'W	Aug-Sep	K, wet season	Morel 1968

MORE BIRD RECORDS FROM THE REPUBLIC OF TOGO

by Robert A. Cheke

Received 11 June 1982

Recently Browne (1980) and Cheke & Walsh (1980) have published complementary papers on the birds of Togo; the former dealt with coastal records and the latter authors mainly with birds in the north of the country. From May to mid-August 1980 and from late August to early December 1981 I was again based at Lama-Kara, in northern Togo, and describe here some observations of interest made during the above periods. These observations include records, marked in the following list with asterisks, of 43 species which did not appear in the earlier list (Cheke & Walsh 1980). Coordinates of named sites are listed in an appendix but many of the places mentioned were marked on the map in the earlier paper. The order and nomenclature for all Afrotropical species follow Hall & Moreau (1970) and Snow (1978).

**Tachybaptus ruficollis* One on the Mono river 25 km east of Sotouboua at 08°33'N 01°16'E on 4 November 1981.

**Nycticorax nycticorax* Two beside the Mono river near Atchinedji on 4 November 1981.

Bubulcus ibis Ten at Cinkanse on 10 October 1981 is my earliest dry season record and my latest is a single bird at Landa-Pozanda on 21 June 1980.

**Ardeola ralloides* One near Naboulgou on 24 May 1980. Up to four in the Tététo area during November 1981. One 10 km N.W. of Anié at 07°50'N 01°08'E on 27 November 1981 and one at Sansanné-Mango on 7 December 1981. Also recorded by Browne (1980) and by Robinson (1972).

**Egretta garzetta* One near Naboulgou on 10 October 1981 and another at Tététo on 10 November 1981. Also recorded by Robinson (1972).

Ciconia episcopus Five at Naboulgou on 19 May 1980 and another there on 24 May 1980.

Ephippiorhynchus senegalensis Two at Naboulgou on 19 May 1980.

Bostrychia hagedash Small groups recorded at Naboulgou in May and December, at various sites along the Mono river in June, October, November and December, beside the Ogou river in September and October, beside the Anié river in October and the Kpaza river in June.

**Sarkidiornis melanotos* Two on a bank beside the Oti river south of Sansanné-Mango on 7 December 1981.

Nettapus auritus A pair at Naboulgou on 25 May 1981.

- **Anas querquedula* A pair at Naboulgou on 10 October 1981.
- **Trigonoceps occipitalis* One at 08°43'N 01°16'E in gallery forest beside the Mono river on 20 October 1981.
- **Pseudogyps africanus* One 5 km N of Blitta on 13 June 1980 and another at 08°44'N 01°16'E on 20 October 1981. Recorded by De Roo et al (1972).
- Polyboroides typus* Recorded from various sites along the Mono river in May, June, October, November and December. One at Landa-Pozanda on 5 September 1981.
- **Terathopius ecaudatus* One at 09°04'N 00°44'E on 19 May 1980, one 15 km E of Aou Losso at 08°43'N 01°12'E on 12 June 1980 and another at the same site on 28 October 1981.
- Buteo auguralis* Recorded on seven different occasions in the Sokodé area in May, June, October and November.
- Butastur rufipennis* One near Tététou on 26 November 1981 is my most southerly record.
- Polemaetus bellicosus* Two in the Keran reserve near Naboulgou on 25 May 1980.
- **Hieraetus fasciatus* One 20 km E of Aou Losso at 08°41'N 01°15'E on 22 October 1981 and another being mobbed by Pied Hornbills *Tockus fasciatus* near Tététou on 28 November 1981.
- **Aquila wahlbergi* One near Bafilo on 15 June 1980.
- **Haliaetus vocifer* A juvenile beside the Anié river near Tchébébé at 08°23'N 00°58'E on 28 October 1981 and an adult near Tététou on 19 November 1981.
- **Chelictinia riocourii* One as far south as Bafilo on 27 October 1981 and another at Sansanné-Mango on 7 December 1981.
- Pandion haliaetus* One seen beside the Mono river south of Tététou (at 06°53'N 01°36'E) on 10 November, 28 November and 3 December 1981.
- **Falco alopex* One near Péwa on 22 June 1980.
- **Francolinus albogularis* One near Landa-Pozanda on 18 October 1981. Recorded by De Roo et al (1969).
- Porphyrio alleni* One at Lama-Kara on 19 July 1980.
- Podica senegalensis* During May to July 1980 this species was recorded from many rivers including the Mono (as far south as Tététou and as far north as 08°56'N 01°21'E), the Na, Koué, Aou, Anié, Pasa and Kpaza (where one record was from high up in the Fazao mountains). During the dry season of 1981 I have no records other than from the Mono river and all these were south of Atchinedji.

- Charadrius forbesi* Three at Landa-Pozanda on 16 May 1980. Two of these were apparently paired as they reacted together against the third when it alighted near them. The paired birds opened their wings a little, lent forward, puffed out their chests to display their pectoral bands and ran simultaneously at the 'intruder' which retreated by flying off on its own. One was also seen at Landa-Pozanda on 2 June 1980 and two were present there on 31 October 1981.
- **Himantops himantops* One at Tététou on 26 November 1981. Robinson (1972) recorded this species many times and it was also seen by Browne (1980).
- **Tringa ochropus* Flocks of up to 20 seen along the Anié and Mono rivers during November 1981.
- **Tringa glareola* One 10 km N.W. of Anié at 07°50'N 01°08'E on 25 November 1981. Recorded by De Roo et al (1969), Robinson (1972) and Browne (1980).
- **Tringa totanus* One beside the Keran river at Naboulgou on 7 December 1981. Recorded by Robinson (1972).
- Glareola nuchalis* Records in Togo, including breeding by *G. n. liberiae* and the occurrence of *G. n. nuchalis* at Landa-Pozanda, have appeared elsewhere (Cheke 1980, 1982).
- **Columba guinea* One at Landa-Pozanda on 21 June 1980, three at Cinkanse on 30 September 1981 and one at Sansanné-Mango on 7 December 1981. Recorded by De Roo et al (1971).
- Corythaeola cristata* Five near Fazao on 27 June 1980 and two there on 13 July 1980.
- Tauraco persa* One at Tchébébé on 12 October 1981 and another at Tététou on 28 November 1981.
- Climator levaillantii* One at Lama-Kara on 1 June 1980. A single at Landa-Pozanda on 2 June 1980 and two there on 25 August 1981. One at Lama-Kara on 17 October 1981.
- **Cuculus solitarius* One calling in the Assouakoko forest, 40 km N of Badou, on 26 May 1980 and another calling and observed near Péwa on 6 September 1981.
- Cuculus gularis* One at Naboulgou on 25 May 1980.
- Glaucidium perlatum* One seen at Lama-Kara on 8 July 1980.
- **Apus melba* A group of about 50 birds seen in the Fazao mountains at 08°33'N 00°40'E on 17 May 1980. Douaud (1957) recorded this species from Togo in April during two different years and the few records from West Africa were discussed by Moreau (1972) who doubted if they referred to African residents. The only records from Ghana were in February and March (Grimes 1974, Walsh & Grimes 1981). Snow (1978) refers to the species as *Tachymarptis melba*.

Ceryle maxima Recorded from Naboulgou on 19 May 1980 and 7 December 1981. Singles also seen in the Fazao mountains at 08°36'N 00°42'E on 13 June 1980, Landa-Pozanda on 11 October 1981 and beside the Anié river at 08°21'N 00°58'E on 28 October 1981.

**Alcedo cristata* One at 10°11'N, 00°54'E on 19 and 21 May 1980 and one at Lomé on 25 July 1980. Recorded by Robinson (1972) and Browne (1980).

Ispidina picta Singles seen in 1980 at Naboulgou (25 May), Lama-Kara (1 July) and Sansanné-Mango (6 August).

Halcyon leucocephala One at Naboulgou on 25 May 1980 and one at Lama-Kara on 1 June 1980 which was engaging in disputes, presumably over a feeding territory, with an *H. senegalensis*.

**Merops pusillus* Two at Lama-Kara on 1 June 1980. Recorded by De Roo et al (1969).

**Merops hirundineus* One in the Keran reserve near Naboulgou on 25 May 1980 and another at Lama-Kara on 1 June 1980.

Merops albicollis A flock of 50 seen flying over 09°04'N 00°44'E on 19 May 1980, 30 flying N.W. over Mo on 31 May 1980 and 32 flying in the same direction above Landa-Pozanda on 1 June 1980. Three near Tététo on 28 November 1981.

Merops nubicus One near Sansanné-Mango on 30 September 1981.

Coracias cyanogaster Three seen near Fazao on 12 July 1980, two of which were displaying by performing aerial acrobatics.

**Bycanistes fistulator* Twelve near Paza on 17 May 1980. The extent of white on these birds suggested that they belonged to the eastern race *B. f. sharpii* (see Bannerman 1953, Snow 1978). De Roo et al (1969) recorded *B. fistulator* from Aledjo but did not assign their specimens to a subspecies. I also saw a flock of 20-30 in gallery forest alongside the Ogou river near Goubi on 25 September 1981 and have other records at various dates from similar habitats 30 km E of Sotouboua, 20 km S of Atakpamé and in the Fazao mountains.

Tockus fasciatus Two at Lama-Kara on 29 May 1980 are my most northerly records.

**Tockus erythrorhynchus* One at Cinkanse on 7 December 1981. Recorded by De Roo et al (1969).

**Dendropicos fuscescens* One near Cinkanse on 6 August 1980.

Hirundo smithii Two pairs bred at Landa-Pozanda in 1981. On 24 October two active nests were found, one contained three 3-4 day old chicks and the other also supported young but was in an inaccessible position. The species probably also bred there in 1980 as eight birds, including some juveniles, were seen roosting near a recently vacated nest on 28 May.

- Hirundo lucida* Bred at Naboulgou in May 1980. The species probably also breeds further south as a pair were seen feeding fledglings at Fazao on 12 July 1980 and of about 25 present at Lama-Kara on 5 August 1980 many were juveniles.
- **Hirundo aethiopica* At least 30 were present at Fazao on 22 November 1981. Louette (1975) recorded an adult and three juveniles of this species taken in March 1970 at Kolékopé, also in Togo, in company with *H. lucida*. Louette's records were the first for Togo of *H. aethiopica* which is usually allopatric with *H. lucida*, the western representative of the superspecies (Hall & Moreau 1970). However *H. aethiopica* is now known to occur in Ghana also and has been found breeding on the Accra plains where it is thought to be a wet season visitor (Grimes 1972, J. F. Walsh pers. comm.). In addition, two were seen by J. F. Walsh on 5 May 1971 at Sugu (09°00'N 00°58'W) in Ghana, a town where *H. lucida* is known to breed (J. F. Walsh, pers. comm.). Also *H. lucida* has been found as far east as Jebba (09°08'N 04°49'E) in Nigeria (Bannerman 1953). These records, confirming an overlap in the species' ranges suggest that further studies of their migrations and ecology would be of interest.
- Hirundo senegalensis* Three at Lama-Kara on 8 July 1980 and two at Fazao on 13 July 1980.
- Hirundo fuligula* One near Aledjo on 16 May 1980. Three at Djamdé on 8 June 1980 and a pair seen at Péwa on 19 June 1980, 23 August 1981 and 6 September 1981.
- Hirundo preussi* At least twenty pairs nested under a bridge over the Keran river at Titira in June 1980.
- **Psaldoprocne obscura* A pair seen at 09°04'N 00°44'E on 19 May 1980 and three at Fazao on 12 and 13 July 1980.
- Motacilla aguimp vidua* In 1979 I did not see this species north of Sokodé but in 1980 a pair were resident in Lama-Kara, where they probably bred as one was seen carrying food on 18 July. On 31 August 1981 a juvenile was found injured at Lama-Kara from which a male *Ornithophila metallica* Schiner (Diptera: Hippoboscidae) was collected. Blood smears from the bird were examined but no parasites were found.
- Coracina pectoralis* One at Mo on 31 May 1980 and present in October 1981 at Landa-Pozanda where two males were seen chasing each other in the presence of a female on 31st.
- Chlorocichla flavicollis* Singles at Lama-Kara on 1 June 1980 and at Landa-Pozanda on 31 October 1981.
- **Laniarius aethiopicus* One at Naboulgou on 25 May 1980. Recorded by De Roo et al (1969) and by Browne (1980).
- **Oenanthe bottae* Three on grass-covered hills north of De'ale on 7 December 1981.
- **Cercomela familiaris* One near Péwa on 23 August 1981. Recorded by De Roo et al (1969).

**Myrmecocichla cinnamomeiventris* At least three pairs were present amongst rocky outcrops near Péwa on 18 July 1980. Two of the males were black-crowned forms (*M. c. bambarae* or *M. c. cavernicola*) but a third was white-crowned (*M. c. coronata*), the subspecies previously recorded from Togo (De Roo et al 1969, 1971). This observation of both forms occurring sympatrically is of interest since Green (1980) recently drew attention to the presence of these forms in close proximity on neighbouring hills in Benin and discussed their taxonomic status, which remains unclear. Both Bannerman (1953) and Mackworth-Praed & Grant (1973) treated the white-headed form as a separate species. On 23 August 1981 a pair was present at the same site near Péwa and the white-crowned male sang repeatedly from near the summit of an inselberg.

Sphenoeacus mentalis On 1 June 1980 near Lama-Kara one was seen carrying dead grass, presumably for nest-building, into reeds beside the Kara river.

Cisticola aberrans At least three pairs, with singing males, were at Djamdé on 8 June 1980. Also recorded from inselbergs near Péwa in June and July 1980 and August and September 1981. Males were singing there in July 1980 and August 1981.

**Sylvietta brachyura* Three at Mo on 31 May 1980. Recorded by De Roo et al (1969).

**Batis senegalensis* A pair seen at Fazao on 13 July 1980. Recorded by De Roo et al (1969).

**Erannornis longicauda* Two near Lama-Kara on 1 July 1980. Recorded by De Roo et al (1969).

**Terpsiphone viridis* Seen near Sokodé, at Naboulgou and at Mo during May 1980 and at Landa-Pozanda in September and October 1981. Also recorded by De Roo et al (1969).

**Anthreptes collaris* One near Aledjo on 19 June 1980 and another at 08°33'N 00°40'E on 27 June 1980. Recorded by De Roo et al (1969) and by Browne (1980).

**Nectarinia pulchella* A male seen at Naboulgou on 24 May 1980 and another near Sansanné-Mango on 6 August 1980. Recorded by De Roo et al (1972).

**Vidua orientalis* Males seen at Naboulgou on 19 May 1980 and at 07°50'N 01°08'E on 25 November 1981. De Roo et al (1969) recorded *V. o. togoensis* from Sansanné-Mango.

**Nesocharis capistrata* One near Lama-Kara on 1 July 1980. It was a juvenile bird since it had a grey head (Mackworth-Praed & Grant 1973).

Lagonosticta rara One at Titira on 14 June 1980 and pairs at Aleheridé on 22 June 1980 and Fazao on 12 July 1980.

Cinnyricinclus leucogaster One near Aledjo on 22 June 1980.

**Buphagus africanus* Two on a buffalo *Syncerus caffer* at Naboulgou on 10 October 1981.

ACKNOWLEDGEMENTS

I am very grateful to J. F. Walsh for his comments on an earlier draft and for details of his unpublished records of *H. aethiopica* in Ghana. A. M. Hutson identified the hippoboscid fly and M. A. Pierce examined the blood films from the *M. aguimp*.

SUMMARY

Records of birds of interest seen in Togo during 1980 and 1981 are provided. These include information on 43 species which were not included in a list of birds seen in Togo between 1972 and 1979 (Cheke & Walsh 1980).

RESUME

Renseignements sur des oiseaux intéressants vus au Togo pendant 1980 et 1981 sont donnés. 43 espèces présentées ne furent pas incluses dans une liste publiée des oiseaux vus au Togo entre 1972 et 1979 (Cheke & Walsh 1980).

REFERENCES

- BROWNE, P.W.P. (1980) Birds observed near Lomé, Togo in 1976 and 1977. *Malimbus* 2: 51-55
- CHEKE, R.A. (1980) A small breeding colony of the Rock Pratincole *Glareola nuchalis liberiae* in Togo. *Bull. Br. Orn. Cl.* 100: 175-178
- CHEKE, R.A. (1982) Additional information on the Rock Pratincole *Glareola nuchalis* in Togo. *Bull. Br. Orn. Cl.* 102 (in press).
- CHEKE, R.A. & WALSH, J.F. (1980) Bird records from the Republic of Togo. *Malimbus* 2: 112-120
- DE ROO, A., DE VREE, F. & VERHEYEN, W. (1969) Contribution à l'ornithologie de la République du Togo. *Rev. Zool. Bot. Afr.* 79: 309-322
- DE ROO, A., HULSEMANS, J. & VERHEYEN, W. (1971) Contribution à l'ornithologie de la République du Togo. 3. Oiseaux récoltés par la deuxième Mission zoologique belge. *Rev. Zool. Bot. Afr.* 83: 84-94
- DE ROO, A., DE VREE, F. & VAN DER STRAETEN, E. (1972) Contribution à l'ornithologie de la République du Togo. 4. Oiseaux récoltés par la troisième Mission zoologique belge. *Rev. Zool. Bot. Afr.* 86: 374-384
- DOUAUD, J. (1957) Les migrations au Togo (Afrique occidentale). *Alauda* 25: 241-266

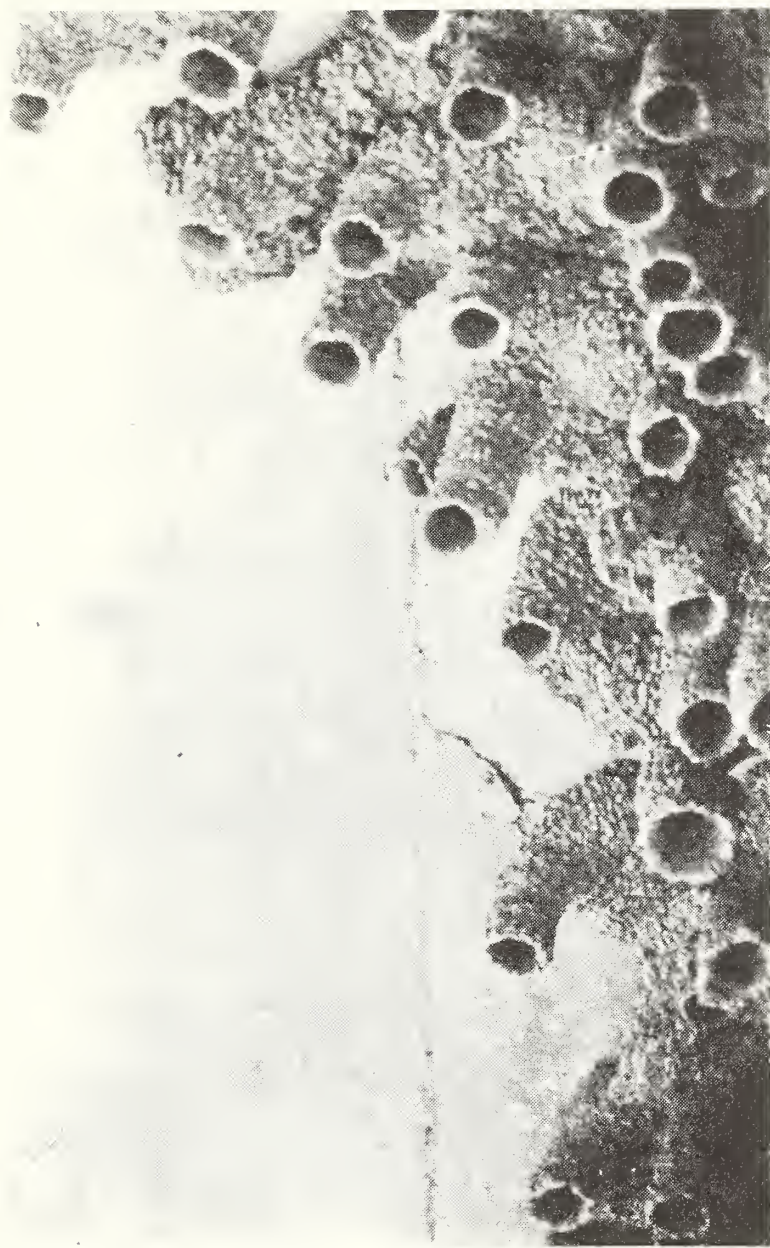
- GREEN, A.A. (1980) Two populations of cliff-chats in the Arli-Pendjari region. *Malimbus* 2: 99-101
- GRIMES, L. (1972) *The Birds of the Accra Plains*. (Duplicated typescript).
- GRIMES, L.G. (1974) Weather conditions in temperate latitudes and the occurrence of Alpine and Mottled Swifts at Accra, Ghana. *Bull. Niger. Orn. Soc.* 10: 38-39
- LOUETTE, M. (1975) Contribution à l'ornithologie de la République du Togo. 5. Oiseaux récoltés par la quatrième Mission zoologique belge. *Rev. Zool. Bot. Afr.* 89: 618-620
- MOREAU, R.E. (1972) *The Palaearctic-African Bird Migration Systems*. Academic Press. London and New York.
- ROBINSON, N. (1972) Bird notes from République du Togo. *Bull. Niger. Orn. Soc.* 9: 85-89
- WALSH, J.F. & GRIMES, L.G. (1981) Observations on some Palaearctic land birds in Ghana. *Bull. Br. Orn. Cl.* 101: 327-334

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APPENDIX

Gazeteer

Aledjo	09°15'N	01°12'E	Kolékopé	07°48'N	01°18'E
Aléheridé	09°13'N	01°12'E	Lama-Kara	09°33'N	01°12'E
Anié	07°45'N	01°12'E	Landa-Pozanda	09°31'N	01°17'E
Aou Losso	08°45'N	01°03'E	Lomé	06°08'N	01°13'E
Atakpamé	07°32'N	01°08'E	Mo	09°05'N	01°03'E
Atchinedji	07°34'N	01°21'E	Naboulgou	10°11'N	00°48'E
Badou	07°35'N	00°36'E	Paza	09°13'N	01°22'E
Bafilo	09°21'N	01°16'E	Péwa	09°16'N	01°14'E
Blitta	08°18'N	00°59'E	Sansanné-Mango	10°21'N	00°28'E
Cinkanse	11°06'N	00°01'E	Sokodé	08°59'N	01°08'E
Defale	09°53'N	01°05'E	Sotouboua	08°34'N	00°59'E
Djamdé	09°32'N	01°03'E	Tchébébé	08°26'N	00°59'E
Fazao	08°42'N	00°46'E	Tététou	07°01'N	01°03'E
Goubi	08°37'N	01°26'E	Titira	10°00'N	01°07'E



Colony of Preuss's Cliff Swallow *Hirundo preussi* (= *H. spilodera*), River Titira, Togo, June 1980. Photo R.A. Cheke

A PRELIMINARY CHECKLIST OF BIRDS IN THE
KILIMI AREA OF NORTHWEST SIERRA LEONE

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Received 12 July 1982

In 1980, the government of Sierra Leone decided to create a national park in parts of Tambakha Chief dom, Bombali District, in the northwest corner of the country on the Guinea border. The proposed park, the nation's first, would unite two nearby but not contiguous game reserves: Outamba, 750 km² in size, and Kilimi, 250 km². These areas were selected because they contained some of the last sizeable populations of threatened or endangered animals in Sierra Leone, including among others chimpanzees, at least seven other primate species, and forest elephants. In addition, the Outamba-Kilimi area sits astride the catchment area of two of the country's largest rivers, the Great Scarcies (Kolenten) and the Little Scarcies (Kaba). It was hoped that by putting an end to swidden (slash and burn) farming and preserving the forests still left in the area, accelerated run-off during the rainy season could be avoided so that the 6,000 km² of prime agricultural land downstream from the proposed park would continue to get enough water during the dry season. As an additional benefit, siltation of the large rivers would be retarded and the freshwater fisheries, on which many Sierra Leoneans depend for protein, would be preserved.

Since that time, implementation of the decision to create a national park has proceeded at a measured pace, but at this writing, final government approval has yet to be granted. While the government as a whole favors the park and the conservation ideals which it represents, certain political realities have had to be confronted, chief among these being the resettlement and compensation of the several hundred farmers still living within the boundaries of the proposed park. Nevertheless, progress continues to be made, and it is hoped that Outamba-Kilimi will be formally designated a national park by the end of 1982 or early 1983.

To assist in planning for the proposed park, the authors were invited to undertake a survey of the large mammals in the Kilimi section, and spent from November 1981 to May 1982 in that task. While our previous field experience had involved mammals, and particularly primates, we have long maintained an enthusiastic interest in birds. Work done during the past twelve years in Kenya had already exposed us to many African birds, and we decided that during the Kilimi mammal survey we would try to identify as many of the birds we saw in the course of our work as possible.

Thus, while the checklist appended here is the result of serious fieldwork, it is by no means an exhaustive list of all the birds in the Kilimi section of the proposed park. Those familiar with the West African avifauna will note immediately that the list is long on large, conspicuous species and short on the smaller, cryptic ones. It will also be apparent that the area contains forest, savannah, and water birds. This is so because, although the Kilimi section is largely tall-grass savannah, small deciduous forests remain along stream valleys and hilltops, so that both forest and savannah species of the same genus can be found there (e.g.,

Centropus leucogaster and *C. senegalensis*). Finally, since the Great Scarcies (Kolenten) river forms the western boundary of the Kilimi area, water birds are numerous.

We do not doubt that a complete survey of the Kilimi section of the park would greatly extend the list we present here, and indeed, we hope that such a survey will take place during the next year, for the area is far richer ornithologically than our limited resources allowed us to document. Nevertheless, since this part of Sierra Leone is an unexplored area as far as birds are concerned, we hope this list will be of interest to ornithologists and of value to any eventual survey of the region.

For convenience and consistency, we have used the classification of Serle & Morel (1977).

ACKNOWLEDGEMENTS

We thank Alan and Hilary Tye of Fourah Bay College, University of Sierra Leone, for their help and encouragement. Nigel Wakeham of Freetown was most helpful with field identifications, and Dr Peter White and the Dept. of Biological Sciences at Njala University College provided greatly appreciated support. We are also grateful to the Ministry of Agriculture and Forestry, especially to the Forestry Division and the headquarters and field staffs of the Wildlife Conservation Branch, who provided invaluable help during our stay in Sierra Leone. Finally, financial support from the Charles A. Lindbergh Fund, the National Geographic Society, and the World Wildlife Fund - US is gratefully acknowledged.

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APPENDIX 1. Annotated list of birds observed in the Kilimi section of the proposed Outamba-Kilimi National Park, Sierra Leone, November 1981-May 1982.

Species Sequence and nomenclature follow Serle, Morel & Hartwig (1977).
Abundance A, one or two sightings; B, frequent; C, common.
Nesting * = nest recorded.
Month Numerals indicate months when species observed.
Habitat A, riparian; B, boliland (seasonally flooded grassland); C, swamp; D, deciduous forest; E, savanna; F, human habitation.
 X = habitat(s) in which observed.

SPECIES	ABUNDANCE NESTING	MONTH	HABITAT					
			A	B	C	D	E	F
<i>Phalacrocorax africanus</i>	C	12-5	X					
<i>Anhinga rufa</i>	B	12-5	X					
<i>Ardeola ralloides</i>	B	3-5	X	X				
<i>A. ibis</i>	B	12-5	X	X				
<i>Butorides striatus</i>	B	1-5	X					
<i>Egretta alba</i>	B	1-5	X	X				
<i>E. gularis</i>	C	12-5	X					

SPECIES	ABUNDANCE NESTING	MONTH	HABITAT						
			A	B	C	D	E	F	G
<i>Ardea cinerea</i>	B	12-5		X					
<i>A. melanocephala</i>	A	12-5		X					
<i>A. purpurea</i>	A	12		X					
<i>Scopus umbretta</i>	C *	12-5	X	X		X			
<i>Ciconia episcopus</i>	B *	1-5		X		X			
<i>Bostrychia hagedash</i>	C	1-5	X	X					
<i>Plectropterus gambensis</i>	B	12-5		X					
<i>Pteronetta hartlaubii</i>	A	1	X						
<i>Gyps bengalensis</i>	A	12	X						
<i>Neophron monachus</i>	B	1-5	X						
<i>Gypohierax angolensis</i>	C	12-5	X	X					
<i>Circus macrourus</i>	A	12		X					
<i>C. aeruginosus</i>	A	12		X					
<i>Polyboroides radiatus</i>	A	12						X	
<i>Circaetus gallicus</i>		12	X						
<i>Kaupifalco monogrammicus</i>	B	4-5						X	
<i>Butastur rufipennis</i>	B	3-5						X	
<i>Buteo auguralis</i>	B	12-5						X	
<i>Lophaetus occipitalis</i>	A	11		X					
<i>Haliaeetus vocifer</i>	B *	12-5	X						
<i>Milvus migrans</i>	B	12-5	X						X
<i>Francolinus bicalcaratus</i>	B	12-5						X	
<i>Numida meleagris</i>	B	1-5		X			X		
<i>Podica senegalensis</i>	B	12-5	X						
<i>Neotis denhami</i>	A	12-5						X	
<i>Actophilornis africana</i>	B	12-5	X						
<i>Burhinus senegalensis</i>	C	12-5	X						
<i>Vanellus lugubris</i>	B			X				X	
<i>V. senegallus</i>	B	4-5		X				X	
<i>Charadrius dubius</i>	A	12	X						
<i>C. forbesi</i>	B	4-5	X					X	
<i>Tringa glareola</i>	B	3-4	X						
<i>T. hypoleucos</i>	C	12-4	X						
<i>T. totanus</i>	A	1-2						X	
<i>Pluvianus aegyptius</i>	B	12-5	X						
<i>Glareola nuchalis</i>	B	4-5	X						
<i>Streptopelia semitorquata</i>	C	12-5					X	X	
<i>S. vinacea</i>	C	12-5	X					X	
<i>Turtur tympanistria</i>	B	3-5					X		
<i>T. afer</i>	B	3-5						X	
<i>Treron australis</i>	A	12-1						X	
<i>Tauraco persa</i>	C	12-5	X	X		X			
<i>Corythaeola cristata</i>	B	12-5	X						
<i>Centropus leucogaster</i>	A	5					X		
<i>C. senegalensis</i>	B	12-5						X	
<i>Macrodipteryx longipennis</i>	B	2-5					X		
<i>Cypsiurus parvus</i>	A	3						X	
<i>Ceryle maxima</i>	A	12-3	X						
<i>C. rudis</i>	B *	12-5	X						
<i>Alcedo quadribrachys</i>	C	12-5	X						
<i>A. cristata</i>	A	12-5	X						

SPECIES	ABUNDANCE NESTING	MONTH	HABITAT					
			A	B	C	D	E	F
<i>Halcyon malimbica</i>	C	12-5	X					
<i>H. chelicuti</i>	B						X	
<i>H. leucocephala</i>	B	12-5					X	
<i>Merops albicollis</i>	A	4					X	
<i>M. pusillus</i>	A	5					X	
<i>Coracias abyssinica</i>	B	1-5					X	
<i>C. cyanogaster</i>	B	12-5					X	
<i>Eurystomus glaucurus</i>	B	3-5					X	
<i>Phoeniculus purpureus</i>	A	1					X	
<i>Tockus nasutus</i>	B	12-5	X	X			X	
<i>T. fasciatus</i>	B	12-5		X			X	
<i>Lybius bidentatus</i>	A	3-5						X
<i>Dendrocopos obsoletus</i>	B *	2-5					X	
<i>Mesopicos goertae</i>	A	1-5			X			
<i>Hirundo rustica</i>	B	2-5					X	
<i>H. nigrita</i>	B	12-5	X					
<i>H. smithii</i>	A	1				X		
<i>Motacilla flava</i>	A	12	X					
<i>M. aguimp</i>	B	12-5	X					
<i>Macronyx croceus</i>	B	2-5					X	
<i>Prionops plumata</i>	C	12-5				X		
<i>Dryoscopus gambensis</i>	A	3-5					X	
<i>Tchagra minuta</i>	A	5					X	
<i>T. senegala</i>	B	12-5					X	
<i>Laniarius turatii</i>	B	1-5				X	X	
<i>Malaconotus sulfureopectus</i>	A	3-5					X	
<i>Oriolus auratus</i>	B	1-5				X	X	
<i>Dicrurus adsimilis</i>	B	12-5				X	X	
<i>Onychognathus fulgidus</i>	A	3				X		
<i>Cinnyricinclus leucogaster</i>	B	3-5					X	X
<i>Corvus albus</i>	B	12-5					X	
<i>Coracina pectoralis</i>	A	3					X	
<i>Pycnonotus barbatus</i>	C	12-5				X	X	X
<i>Baeopogon indicator</i>	A	5				X		
<i>Nicator chloris</i>	A	1				X		
<i>Saxicola rubetra</i>	B	3-5					X	
<i>Stiphrornis erythrothorax</i>	A	2				X		
<i>Cossypha niveicapilla</i>	B	2-5				X		
<i>Malococincla cleaveri</i>	B	1-5	X					
<i>Phyllanthus atripennis</i>	B	1-5				X		
<i>Sphenoeacus mentalis</i>	A *	5					X	
<i>Hippolais polyglotta</i>	A	5					X	
<i>Prinia subflava</i>	B	5					X	
<i>Camaroptera brachyura</i>	C	12-5				X	X	
<i>Eremomela pusilla</i>	B	2-5					X	
<i>Muscicapa cassini</i>	B	5	X					
<i>Fraseria cinerascens</i>	A	2-3	X					
<i>Melaenornis edolioides</i>	B	12-5					X	
<i>Bias musicus</i>	A	3					X	
<i>Batis senegalensis</i>	B	3-5					X	
<i>Platysteira cyanea</i>	B	3-5				X		
<i>Tersiphone rufiventer</i>	B	1-5				X		
<i>Tersiphone viridis</i>	B	3-5				X		

SPECIES	ABUNDANCE NESTING	MONTH	HABITAT					
			A	B	C	D	E	F
<i>Salpornis spilonota</i>	B	3-5					X	
<i>Anthreptes gabonicus</i>	B	3-5	X					
<i>Nectarinia coccinigaster</i>	B	5						X
<i>Ploceus cucullatus</i>	C	1-5					X	X
<i>P. nigerrimus castaneofuscus</i>	B	2-5					X	X
<i>P. melanocephalus capitalis</i>	B	4-5			X			
<i>P. nigricollis brachypterus</i>	B	5						X
<i>Euplectes macrourus</i>	B	4-5		X			X	
<i>E. orix</i>	A	11					X	
<i>Vidua macroura</i>	B	2					X	
<i>V. funerea nigeriae</i>	A	12					X	
<i>V. orientalis</i>	A	12					X	
<i>Clytospiza dybowskii</i>	B	3-5			X			
<i>Lagonosticta senegala</i>	C	12-5					X	X
<i>L. rubricata</i>	B	2-5					X	X
<i>Amandava subflava</i>	B	4		X				
<i>Lonchura cucullata</i>	C	3-5						X



Three week old White-faced Scops Owl *Otus leucotis* in nest of Hamerkop *Scopus umbretta*, central Mali. Photo R.T. Wilson

PALAEARCTIC BIRDS WINTERING IN SOUTHWEST MAURITANIA: SPECIES,
DISTRIBUTIONS AND POPULATION ESTIMATES

by P. W. P. Browne

Received 7 May 1982

INTRODUCTION

Since the pioneering work (in so far as West Africa is concerned) of Morel & Roux (1966, 1973), it has been known that many Palaearctic birds winter in northern Senegal. There are also important wintering grounds for Palaearctic waders, terns and gulls in northwest Mauritania (Banc d'Arguin - Nouadhibou, Pététin & Trotignon 1972, Trotignon 1980). The inundation zone of the Niger in Mali is another immense wintering area for Palaearctic birds and information for that country has recently been summarized by Lamarche (1980-81). This paper reports on a study of Palaearctic birds wintering in that part of Mauritania which lies between these three zones (Fig. 1). The only previous work apparently consisted of two surveys from a boat of c. 20 km of the north bank of the Senegal River (about 16°30'N, 15°40'W) by Dr G. Morel (pers. comm.) in December 1963 and January 1964, an aerial survey of 25 localities (mostly near the Senegal River) which attract water birds by Tréca and Roux (Roux *et al.* 1978 and pers. comm.) on 6 December 1975 and records of recoveries of two ringed birds near Nouakchott in January 1978 (Trotignon 1980).

I attempted to determine which Palaearctic species occurred, to delineate the limits of winter quarters of those not found over the whole area and to estimate the total numbers present.

All the observations were my own made in the months of January and December 1978, 1979, 1980, 1981 and January 1982 (except for supporting data collected in other months). December and January were chosen to as to avoid if possible the inclusion of passage migrants. Passage of Palaearctic birds was found to be noticeable in November and again in February (as shown below, it also occurred to a small extent in December and January).

A total of 122 hours of observation was made at 73 different localities, usually near main roads reached by car from Nouakchott, and including all major types of habitat in southwest Mauritania (see Table 1, Fig. 1). The amount of time spent in each habitat (Table 1) was not proportional to the extent of that habitat in southwest Mauritania. In fact, this part of the country is about 90% dry steppe, little influenced by man (A in Table 1), but only about 35% of my time was spent in such habitat. More time was spent in wet habitats where most of the Palaearctic species occurred.

Because birds were quite visible on dry steppe with scattered bushes and little ground cover, I was able to identify and count most small birds in an area of about 30 ha (0.3 sq km) per hour (and greater areas for larger birds). The 30 localities visited in natural dry steppe were a reasonably random selection, so I have been able to estimate the populations of some species which seemed to be evenly spread.

Table 1 Description of habitats and visits made to each

Natural habitat	Influence of man	Identifying symbol	Number of localities	Hours of observation
	Insignificant (occasional herds of domestic animals)	A	30	42.1
Dry steppe: sandy soil, vegetation varying from scattered bushes to occasional <i>Acacia</i> forest	Significant - buildings, refuse heaps, cultivation without surface water	B	16	25.6
Rocky escarpment	Insignificant	C	3	4.8
Open ocean observed from beach	Insignificant	D	2	2.1
On and around salt (*) water shores and pools; some bushes	Insignificant	E	9	9.6
	Significant - buildings, refuse	F	4	9.2
Vicinity of fresh (*) water	Significant - cultivation, irrigation systems	G	9	28.6
Total			73	122.0

(*) To some extent the distinction between salt and fresh water pools was arbitrary as varying amounts of salt are present in the soil and so in standing water in many parts of Mauritania, but the closer to the coast, the greater the amount of salt. I have assumed that all standing water in the Senegal River delta was salt as well as all pools near Nouakchott except in the irrigated gardens; all other pools were considered fresh.

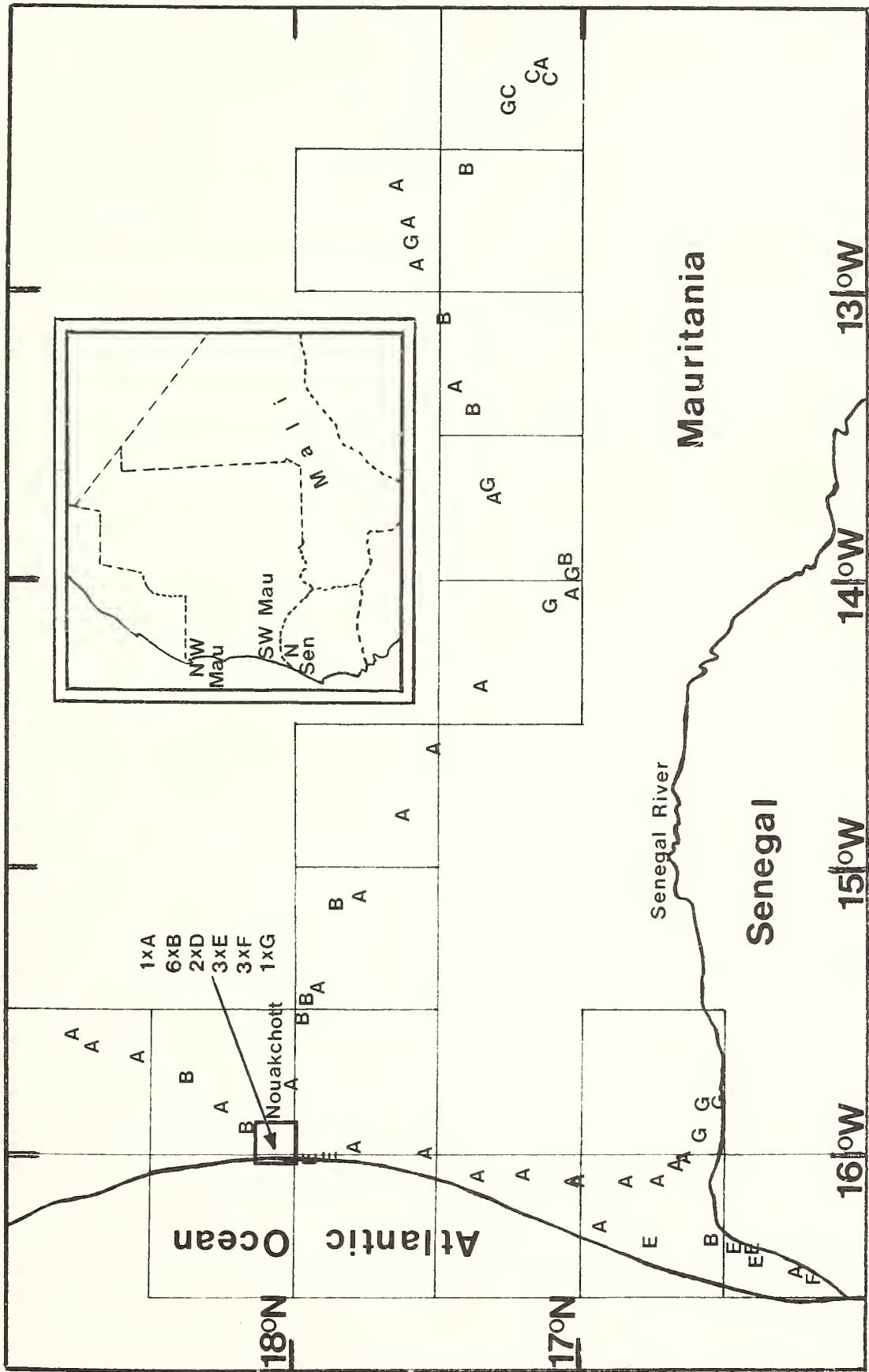


Figure 1 Southwest Mauritania showing localities and half degree squares where observations were made on wintering Palaearctic birds and, inset, neighbouring areas used for comparison. See Table 1 for meaning of A-G.

SPECIES CONCERNED

Altogether I observed 103 Palaearctic species. 11 are excluded as being probable passage migrants and 14 more because they breed in or near Mauritania and their Palaearctic origin was uncertain. Three species' identities needed confirmation. See Appendix 3 for evidence used in including and excluding species. Morel (pers. comm.), Tréca & Roux (pers. comm.) observed *Platalea leucorodia*, *Limosa limosa* and *Sterna leucoptera*, while Trotignon (1980) recorded the recovery of *Stercorarius skua* and *S. parasiticus*. I saw none of these five species in December and January.

I counted the number of birds of each species at each locality on each visit and subsequently the bird days were summed for each species in each type of habitat. A summary of the records of the 83 (103-11-14+5) species is given in Table 2. This shows the number seen in each type of habitat as well as the number of localities at which each species was recorded. At the end of the table is a summary per type of habitat. For localities at which each species occurred see Appendix 2.

LIMITS OF WINTER QUARTERS

(a) Habitat preference

For 55 species which I observed, winter quarters were limited by habitat preference. 45 species were confined to the vicinity of standing water, either salt or fresh. They can be divided into four groups:

(1) Open ocean: along the whole coast:

Sula bassana, *Sterna sandvicensis*.

(2) Salt water shores and pools: the whole coast and pools in the Senegal delta, mainly west of 16°W:

Ciconia nigra, *Pluvialis squatarola*, *Charadrius hiaticula*, *Limosa lapponica*, *Arenaria interpres*, *Calidris canutus*, *C. ferruginea*, *C. alba*, *Haematopus ostralegus*, *Larus fuscus*.

(3) Vicinity of fresh or salt water shores and pools (winter quarters (2) and (4) combined):

Egretta alba, *E. garzetta*, *Ardea cinerea*, *Anas acuta*, *Circus pygargus*, *Charadrius dubius*, *Tringa hypoleucos*, *T. totanus*, *Calidris alpina*, *C. minuta*, *Philomachus pugnax*, *Recurvirostra avosetta*, *Larus ridibundus*.

(4) Vicinity of fresh water: mainly pools and lakes left by rain, which gradually dry up as the dry season advances (Nov.-June) but are still very significant Dec.-Jan. The pools appear to be found right across the country south of about 18°N. Also irrigated areas near Rosso (16°31'N, 15°48'W) and Nouakchott:

Ciconia ciconia, *Plegadis falcinellus*, *Anas querquedula*, *A. clypeata*, *Circus aeruginosus*, *Coturnix coturnix*, *Tringa nebularia*, *T. stagnatilis*, *T. glareola*, *T. ochropus*, *T. erythropus*, *Gallinago gallinago*, *Calidris*

temminckii, *Apus melba*, *Riparia riparia*, *Motacilla cinerea*, *Anthus trivialis*, *A. cervinus*, *Saxicola torquata*, *Luscinia megarhynchos*.

The other ten species showed habitat preferences as follows:

- (5) Where the influence of man was significant (mainly in or near towns and villages):

Milvus migrans, *Hirundo rustica*, *Motacilla alba*.

- (6) Near water as well as man's influence (wet areas; on steppe near cattle):

Motacilla flava.

- (7) In areas with many large trees:

Streptopelia turtur, *Phoenicurus phoenicurus*.

- (8) Rocky escarpment and also around buildings:

Hirundo obsoleta, *Monticola solitaria*.

- (9) Natural dry steppe:

Sylvia hortensis, *Phylloscopus bonelli*.

(b) Geographical limits

Thirteen species and one race were quite widespread but were not found over the whole area studied, each being confined (or almost so) to one section of the territory. My observations covered a range from 16°N to 19°N and from 12°W to 16°30'W. In this area there are 51 half degree squares lying wholly or partly in Mauritania; I visited 17 of them (Fig. 1). Because the coverage was so sparse, I consider that half degree squares define the occurrence of species with sufficient accuracy. Also this ties in with the standard methods for mapping African bird distributions suggested by Ash & Pomeroy (1981).

The amount of time spent in each half degree square was very variable (Fig. 2), but I was able to calculate an abundance rating of any species by dividing the number of bird days by the number of hours of observation. The rating takes the value 1 to 9 on a logarithmic scale (base: $\sqrt{10}$ or c. 3.2 - see Fig. 2). It has a wider range than the rating of 0-5 suggested by Ash & Pomeroy, though the range can be changed easily. However, it is of a different nature from theirs in that it is based objectively upon counts of birds observed per hour instead of on a subjective assessment of abundance. It has the advantage that scarcity, corresponding to low values of the rating, can only be shown when the number of hours of observation in a square is high. On the other hand, misleadingly high ratings can occur when the number of hours of observation is very low, especially if the observer chooses a relatively rich habitat for his brief survey. In the present study, observations from all habitats were lumped together to produce the ratings,

Table 2 Palaeartic winter visitors to southwest Mauritania: bird days in each habitat and number of localities at which seen

Species	Bird days in each habitat							Total	Number of locs.
	Dry				Wet				
	A*	B	C	D	E	F	G		
<i>Sula bassana</i>	-	-	-	24	-	-	-	24	2
<i>Egretta alba</i>	-	-	-	-	50	-	6	56	2
<i>E. garzetta</i>	-	-	-	-	12	-	3	15	2
<i>Ardea cinerea</i>	-	-	-	-	32	-	40	72	7
<i>Ciconia ciconia</i>	-	-	-	-	-	-	1	1	1
<i>C. nigra</i>	-	-	-	-	3	-	-	3	1
<i>Plegadis falcinellus</i>	-	-	-	-	-	-	30	30	1
<i>Platalea leucorodia</i>	seen by Tréca and Roux								
<i>Anas acuta</i>	-	-	-	-	1	3	401	405	4
<i>A. querquedula</i>	-	-	-	-	-	-	93	93	5
<i>A. clypeata</i>	-	-	-	-	-	-	20	20	2
<i>Gyps fulvus</i>	1	-	-	-	-	-	-	1	1
<i>Neophron percnopterus</i>	-	1	2	-	-	-	1	4	3
<i>Circus macrourus</i>	1	-	-	-	-	-	-	1	1
<i>C. pygargus</i>	-	-	-	-	1	-	3	4	4
<i>C. aeruginosus</i>	-	-	-	-	-	-	7	7	4
<i>Circaetus gallicus</i>	-	-	1	-	-	-	1	2	2
<i>Buteo rufinus</i>	1	-	-	-	-	2	-	3	2
<i>Hieraaetus pennatus</i>	1	-	-	-	-	-	1	2	2
<i>Milvus migrans</i>	7	331	-	-	2	181	65	586	18
<i>Falco peregrinus</i>	-	1	2	-	-	-	1	4	3
<i>F. tinnunculus</i>	5	4	-	-	-	1	12	22	14
<i>Coturnix coturnix</i>	-	-	-	-	-	-	5	5	1
<i>Pluvialis squatarola</i>	-	-	-	-	14	5	-	19	3
<i>Charadrius hiaticula</i>	-	-	-	-	21	58	11	90	7
<i>C. dubius</i>	-	-	-	-	-	2	18	20	6
<i>Limosa limosa</i>	seen by Tréca and Roux								
<i>L. lapponica</i>	-	-	-	-	3	1	-	4	2
<i>Tringa nebularia</i>	-	-	-	-	-	-	3	3	2
<i>T. stagnatilis</i>	-	-	-	-	-	-	8	8	5
<i>T. glareola</i>	-	-	-	-	-	-	13	13	5
<i>T. ochropus</i>	-	-	-	-	-	-	3	3	3
<i>T. hypoleucos</i>	-	-	-	-	-	2	2	4	3
<i>T. totanus</i>	-	-	-	-	3	2	8	18	5
<i>T. erythropus</i>	-	-	-	-	-	-	28	28	4
<i>Arenaria interpres</i>	-	-	-	-	1	1	-	2	2
<i>Gallinago gallinago</i>	-	-	-	-	-	-	7	7	3
<i>Calidris canutus</i>	-	-	-	-	8	1	-	9	4
<i>C. alpina</i>	-	-	-	-	63	17	4	84	6
<i>C. ferruginea</i>	-	-	-	-	15	2	-	17	3
<i>C. minuta</i>	-	-	-	-	36	50	38	124	11
<i>C. temminckii</i>	-	-	-	-	-	-	1	1	1
<i>C. alba</i>	-	-	-	-	216	217	-	433	4

<i>Philomachus pugnax</i>	-	-	-	-	-	1	757	758	5
<i>Haematopus ostralegus</i>	-	-	-	-	12	2	-	14	2
<i>Recurvirostra avosetta</i>	-	-	-	-	25	1	1	27	3
<i>Stercorarius skua</i>							recovery reported by Trotignon		
<i>S. parasiticus</i>							recovery reported by Trogignon		
<i>Larus ridibundus</i>	-	-	-	-	18	6	8	32	7
<i>L. fuscus</i>	-	-	-	-	116	102	-	218	4
<i>Sterna sandvicensis</i>	-	-	-	38	-	-	-	38	2
<i>S. leucoptera</i>							seen by Morel		
<i>Streptopelia turtur</i>	500	-	-	-	-	-	79	579	3
<i>Apus melba</i>	-	-	-	-	-	-	1	1	1
<i>Calandrella brachydactyla</i>	7	92	-	-	-	-	306	405	5
<i>Riparia riparia</i>	-	-	-	-	-	-	54	54	5
<i>Hirundo rustica</i>	-	17	-	-	3	63	37	120	17
<i>H. obsoleta</i>	-	3	2	-	-	-	3	8	3
<i>Delichon urbica</i>	-	5	-	-	-	1	-	6	3
<i>Motacilla flava</i>	7	3	-	-	1	9	57	77	12
<i>M. cinerea</i>	-	-	-	-	-	-	5	5	1
<i>M. alba</i>	13	178	-	-	1	199	585	976	23
<i>Anthus campestris</i>	6	5	-	-	-	-	3	14	9
<i>A. trivialis</i>	-	-	-	-	-	-	5	5	2
<i>A. cervinus</i>	-	-	-	-	-	-	7	7	1
<i>Lanius senator</i>	15	-	-	-	-	-	5	20	9
<i>Saxicola torquata</i>	-	-	-	-	-	-	3	3	1
<i>Oenanthe oenanthe</i>	22	22	-	-	1	18	21	84	27
<i>O. hispanica</i>	28	7	-	-	-	2	15	52	21
<i>O. deserti</i>	21	40	-	-	3	7	-	71	22
<i>O. isabellina</i>	-	2	-	-	-	2	-	4	3
<i>Monticola solitaria</i>	-	3	1	-	-	-	-	4	2
<i>Phoenicurus phoenicurus</i>	3	-	-	-	-	1	13	17	5
<i>P. ochruros</i>	-	-	-	-	-	1	1	2	2
<i>Luscinia megarhynchos</i>	-	-	-	-	-	-	2	2	1
<i>Sylvia hortensis</i>	13	-	-	-	-	-	-	13	9
<i>S. atricapilla</i>	4	7	-	-	-	5	59	75	8
<i>S. communis</i>	1	-	-	-	-	-	-	1	1
<i>S. melanocephala</i>	4	10	-	-	3	3	42	62	12
<i>S. cantillans</i>	23	10	-	-	2	3	12	50	21
<i>S. conspicillata</i>	17	6	-	-	-	2	-	25	12
<i>Phylloscopus collybita</i>	3	22	-	-	-	19	119	163	11
<i>P. bonelli</i>	16	-	-	-	-	-	-	16	7

Number of species	24	21	5	2	28	36	56	78
Total birds	719	769	8	62	671	992	3034	6255
Total hours	42.1	25.6	4.8	2.1	9.6	9.2	28.6	122.0
Birds/hour	17	30	2	29	70	108	106	51

* Habitats A, B, C, D, E, F, G defined in Table 1

though as shown in the bottom line of Table 2, the number of birds/hour varied a lot from one habitat to another. More uniformity would have been achieved by using only the results for natural dry steppe, but then less complete geographical coverage would have been achieved. I would urge other authors to explore the use of such objective ratings by counting all birds seen and the number of hours of observation. The same rating can be used to show seasonal distributions, as is done in Appendix 3.

The ratings are used in Fig. 2 to indicate the geographical distributions of the 13 species and one race. A layout such as this allows the distributions of many species to be shown on the same map. By keeping the position of each species constant within the square and indicating species not found by "-", it is easy to scan the map and pick out the distribution of each species. This procedure is facilitated if a mask is made of the size of the map, with one hole in the same position (eg top right hand corner) for each half degree square, just large enough to reveal the record for a single species. The fact that many species can be shown on one page without the use of colour should allow distribution atlases to be produced more cheaply.

Anthus campestris, *Lanius senator*, *Sylvia hortensis* and *Phylloscopus bonelli*, exhibited a strong preference for southern areas. On the other hand, *Oenanthe deserti* was limited to the northern part of the region. *Oenanthe oenanthe*, *O. hispanica* and *Sylvia cantillans* were fairly evenly distributed except in the very north. *Sylvia atricapilla*, *S. melanocephala*, *S. conspicillata* and *Phylloscopus collybita* were observed only in western areas. *Calandrella brachydactyla* and *Oenanthe oenanthe seebohmii* (the black-throated race, some specimens of which could be recognised in the field) were mainly seen in the east.

ESTIMATES OF POPULATIONS

For eight species which were widespread and evenly distributed over the natural dry steppe, it was possible to calculate approximately the populations of birds in this habitat. Evenness of distribution was determined from the value of χ^2 based on observed occurrences (bird days) and the number expected at each locality, given the number of hours of observation there and that the number to be seen per hour was constant at all localities. Of nine species occurring in five or more localities on natural dry steppe, only *Sylvia conspicillata* gave a significant value of χ^2 , indicating its distribution was uneven (ie flocking or bunching), so it was excluded. An estimate of the total population of each of the other eight species was calculated by dividing the number of birds observed per hour (on dry steppe only, therefore not the same as the ratio used for calculating abundance ratings in Fig. 2, which refers to all habitats) by the number of km² searched per hour (0.3 km² for all passerines except shrikes, 0.4 km² for shrikes, 1.0 km² for raptors) and multiplying the result by the number of km² of dry steppe in the area where the species is believed to winter (Table 3). The total estimated population of these eight species is 1,000,000 birds.

The only other species for which I have even partial estimates of the wintering population were *Milvus migrans* and *Motacilla alba*. Nouakchott attracted by far the largest numbers of both species and all those present in Nouakchott often appeared to form a single group. I counted c. 300 *M. migrans* in January 1981 at the slaughter house, and twice during Dec.

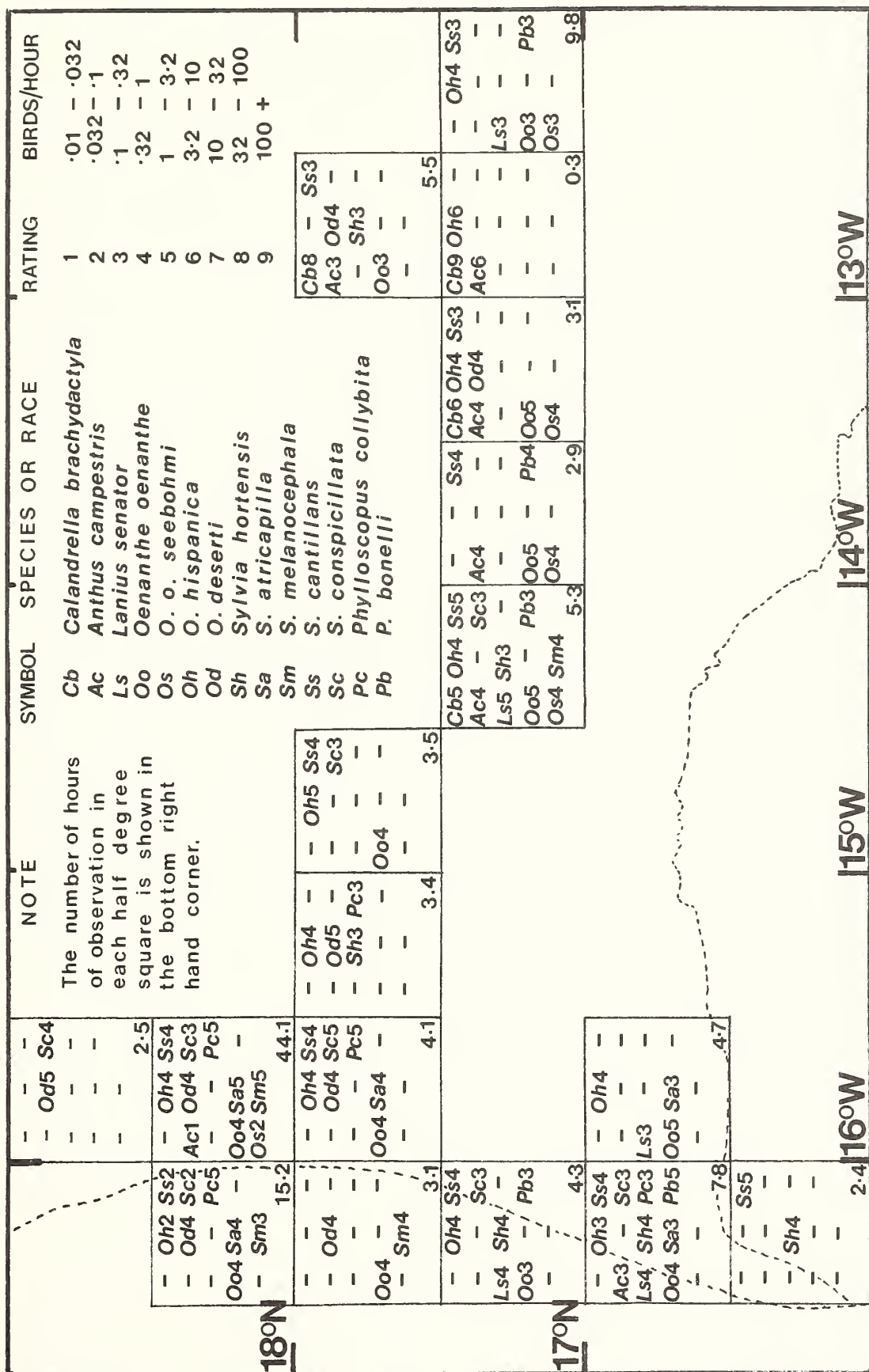


Table 3 Calculation of populations of eight species on natural dry steppe

Species	Area (1)	Birds counted	Hours of obser.	Birds/ hr.	Birds/ km ²	km ² (2)	Estimated population
<i>Falco tinnunculus</i>	south of 18°00'N	5	37.6	0.13	0.13	76,000	10,000
<i>Lanius senator</i>	south of 17°21'N	15	20.7	0.73	1.5	48,000	70,000
<i>Oenanthe oenanthe</i>	south of 18°02'N	22	37.6	0.59	2.0	77,000	150,000
<i>Oenanthe hispanica</i>	south of 18°00'N	28	37.6	0.75	2.5	76,000	190,000
<i>Oenanthe deserti</i>	north of 17°26'N	21	21.4	0.98	3.3	67,000	220,000
<i>Sylvia hortensis</i>	south of 17°54'N	13	34.4	0.38	1.3	72,000	90,000
<i>Sylvia cantillans</i>	south of 17°47'N	23	33.4	0.69	2.3	67,000	150,000
<i>Phylloscopus bonelli</i>	south of 17°21'N	16	20.7	0.77	2.6	48,000	120,000
Total							1,000,000

(1) From the extreme northerly or southerly observations on natural dry steppe
(2) 90% of the Mauritanian land area shown in Figure 1 within the limits indicated in the column "Area"

1978 I counted c. 3500 *M. alba* leaving the apparently only roost in the town, in *Eucalyptus* trees in the town centre.

DISCUSSION

(a) Comparison with neighbouring areas

Publications dealing with Senegal (de Smet & van Gompel 1980, Morel 1972, 1980), northwest Mauritania (Pététin & Trotignon 1972, Trotignon 1980) and Mali (Lamarche 1980-81), together with the present paper, give information on Palaearctic birds wintering in a vast area comprising the western third of the Sahel and the southern Sahara (c. 17°W to 3°E, see inset map Fig. 1). In Table 4, I have summarized the status of 171 Palaearctic species which are considered to be winter visitors to one or more of the areas: northwest Mauritania, southwest Mauritania, northern Senegal (north of 14°N) and central Mali (north of 14°N).

All but one of the 83 Palaearctic species found to winter in southwest Mauritania have also been observed wintering in at least one of these neighbouring areas. The exception is *Phoenicurus ochruros*, but that has previously been recorded south of the Sahara in Mauritania (Atar, 20°31'N, 13°03'W, 7 April 1947, Heim de Balsac 1949-51) and in south Mali (Lamarche 1980-81).

All aquatic species found wintering in southwest Mauritania also winter in nearby northern Senegal, in similar habitats. In northwest Mauritania, the aquatic species occurring in winter are mainly those found in salt water habitats further south, though there are exceptions, eg *Tringa stagnatilis* and *Motacilla cinerea*, which have only been observed wintering near fresh water in southwest Mauritania. Even though aquatic species made up a majority of the species observed in southwest Mauritania, they must represent a minority of the Palaearctic winterers since suitable habitat is very restricted. The birds of the dry steppe form the majority of the wintering populations. There are a few species of raptor, which are much the same as those found in northern Senegal. The most characteristic and numerous Palaearctic birds are passerines.

For two species, *Sylvia melanocephala* and *S. conspicillata*, western Mauritania west of 14°W is the main wintering ground south of the desert. *S. melanocephala* occurs in northern Senegal occasionally (Morel 1972, de Smet & van Gompel 1980), but *S. conspicillata* has not been recorded at all in that country. Neither species has been recorded in Mali. *S. melanocephala* is quite common in the vicinity of Nouadhibou in northwest Mauritania in winter (Trotignon 1980), but the records there of *S. conspicillata* are very few. Consequently it appears that the principal southern wintering ground of that species is in southwest Mauritania.

The other two species confined even more closely to western districts in southwest Mauritania, *Phylloscopus collybita* (west of 15°W) and *Sylvia atricapilla* (west of 15°30'W), winter commonly in both northwest Mauritania and northern Senegal but in Mali apparently only in the south (Lamarche 1980-81). That these species and the two above appear limited to western areas may be accounted for by the marked difference in type of vegetation on the dry steppe as one proceeds from west to east. Non-spiny bushes and trees (*Salvadora persica*, *Euphorbia balsamifera* and *Tamarix senegalensis*)

Table 4 Palaeartic winter visitors to the western Sahel and southwestern Sahara

	NW Maurit.	SW Maurit.	N (14°+) Senegal	Cent (14°+) Mali
<i>Podiceps ruficollis</i>	w	a	A	A
<i>Sula bassana</i>	W	W	W	-
<i>Ixobrychus minutus</i>	-	-*	W	W
<i>Nycticorax nycticorax</i>	p	p*	W	W
<i>Ardeola ralloides</i>	-	p	A	W
<i>Egretta alba</i>	w	W	A	A
<i>E. garzetta</i>	W	W	W	W
<i>Ardea cinerea</i>	W	W	W	W
<i>A. purpurea</i>	p	p*	W	W
<i>Ciconia ciconia</i>	p	w	W	W
<i>C. nigra</i>	p	w	w	p
<i>Geronticus eremitus</i>	-	-	-	w
<i>Plegadis falcinellus</i>	w	W	W	W
<i>Platalea leucorodia</i>	w	w	w	p
<i>Phoenicopterus ruber</i>	W	p*	W	-
<i>Branta bernicla</i>	w	-	-	-
<i>Anser fabalis</i>	-	-	-	w
<i>Tadorna tadorna</i>	-	-	w	-
<i>Anas penelope</i>	w	-	w	W
<i>A. strepera</i>	-	-	w	w
<i>A. crecca</i>	-	-*	W	W
<i>A. platyrhynchos</i>	-	-	-	w
<i>A. acuta</i>	p	W	W	W
<i>A. angustirostris</i>	-	-*	w	w
<i>A. querquedula</i>	p	W	W	W
<i>A. clypeata</i>	-	W	W	W
<i>Aythya ferina</i>	p	p	w	W
<i>A. nyroca</i>	-	-*	w	W
<i>A. fuligula</i>	-	-	w	W
<i>Melanitta nigra</i>	w	-	-	-
<i>Gyps fulvus</i>	w	w	w	w
<i>Neophron percnopterus</i>	w	w	w	W
<i>Circus macrourus</i>	-	w	W	W
<i>C. pygargus</i>	p	w	W	W
<i>C. aeruginosus</i>	W	w	W	W
<i>Circaetus gallicus</i>	p	w	W	W
<i>Accipiter nisus</i>	-	-	-	w
<i>Buteo rufinus</i>	w	w	w	W
<i>B. buteo</i>	w	p	w	P
<i>Hieraaetus spilogaster</i>	w	a	a	a
<i>H. pennatus</i>	p	w	w	w
<i>Milvus migrans</i>	w	W	W	W
<i>Pernis apivorus</i>	-	p	w	w
<i>Pandion haliaetus</i>	W	p	w	W
<i>Falco biarmicus</i>	w	a	w	W

<i>F. cherrug</i>	w	p	w	w
<i>F. peregrinus</i>	w	w	w	w
<i>F. vespertinus</i>	-	-	w	w
<i>F. tinnunculus</i>	w	w	w	w
<i>Coturnix coturnix</i>	p	w	w	w
<i>Porzana parva</i>	-	-*	w	-
<i>P. pusilla</i>	-	-	w	-
<i>P. porzana</i>	p	-*	w	w
<i>Gallinula chloropus</i>	p	p*	w	w
<i>Fulica atra</i>	p	-*	w	w
<i>Burhinus oedicnemus</i>	p	p*	w	w
<i>Vanellus vanellus</i>	p	p	w	-
<i>Pluvialis apricarius</i>	w	p	w	-
<i>P. squatarola</i>	w	w	w	-
<i>Charadrius hiaticula</i>	w	w	w	w
<i>C. dubius</i>	-	w	w	w
<i>C. alexandrinus</i>	w	A	w	w
<i>C. asiaticus</i>	-	-	-	w
<i>Numenius phaeopus</i>	w	p	w	w
<i>N. arquata</i>	w	p	w	w
<i>Limosa limosa</i>	w	w	w	w
<i>L. lapponica</i>	w	w	w	-
<i>Tringa nebularia</i>	w	w	w	w
<i>T. stagnatilis</i>	w	w	w	w
<i>T. glareola</i>	-	w	w	w
<i>T. ochropus</i>	p	w	w	w
<i>T. hypoleucos</i>	-	w	w	w
<i>T. totanus</i>	w	w	w	w
<i>T. erythropus</i>	p	w	w	w
<i>Arenaria interpres</i>	w	w	w	p
<i>Gallinago media</i>	-	-	w	w
<i>G. gallinago</i>	-	w	w	w
<i>G. minima</i>	-	-	p	w
<i>Calidris canutus</i>	w	w	w	w
<i>C. alpina</i>	w	w	w	w
<i>C. ferruginea</i>	w	w	w	w
<i>C. minuta</i>	w	w	w	w
<i>C. temminckii</i>	-	w	w	w
<i>C. alba</i>	w	w	w	w
<i>Limicola falcinellus</i>	-	-	-	w
<i>Philomachus pugnax</i>	w	w	w	w
<i>Phalaropus fulicarius</i>	w	-	p	-
<i>Haematopus ostralegus</i>	w	w	w	w
<i>Recurvirostra avosetta</i>	p	w	w	w
<i>Cursorius cursor</i>	a	A	w	w
<i>Glareola pratincola</i>	p	p	w	w
<i>Stercorarius skua</i>	w	w	w	-
<i>S. pomarinus</i>	w	p	p	-
<i>S. parasiticus</i>	w	w	w	-
<i>Larus melanocephalus</i>	p	-	w	-
<i>L. tridactylus</i>	w	-	p	-
<i>L. ridibundus</i>	w	w	w	w
<i>L. genei</i>	A	p	A	w
<i>L. argentatus</i>	p	p	w	w

<i>L. fuscus</i>	W	W	W	W
<i>Sterna nilotica</i>	A	P	a	W
<i>S. caspia</i>	A	P*	W	W
<i>S. sandvicensis</i>	W	W	W	w
<i>S. dougalii</i>	W	p	p	w
<i>S. hirundo</i>	W	p	W	W
<i>S. hybrida</i>	-	p	W	W
<i>S. leucoptera</i>	p	w	W	W
<i>S. nigra</i>	w	P	W	p
<i>S. albifrons</i>	W	P	W	A
<i>Streptopelia turtur</i>	P	W	W	W
<i>Otus scops</i>	p	p*	W	w
<i>Asio flammeus</i>	p	p	p	w
<i>Caprimulgus ruficollis</i>	-	p	p	w
<i>C. aegyptius</i>	-	-*	W	W
<i>Apus melba</i>	p	w	p	W
<i>A. apus</i>	P	P	P	W
<i>A. pallidus</i>	W	-	p	W
<i>Upupa epops</i>	W	P*	W	W
<i>Jynx torquilla</i>	P	P	w	p
<i>Calandrella brachydactyla</i>	W	W	P	W
<i>Riparia riparia</i>	-	W	W	W
<i>Hirundo rustica</i>	W	W	w	w
<i>H. rupestris</i>	-	-	p	w
<i>H. obsoleta</i>	w	w	-	a
<i>Delichon urbica</i>	w	w	p	P
<i>Motacilla flava</i>	w	W	W	W
<i>M. cinerea</i>	w	w	w	p
<i>M. alba</i>	W	W	W	W
<i>Anthus campestris</i>	w	W	W	W
<i>A. novaeseelandiae</i>	-	-	-	w
<i>A. trivialis</i>	P	w	w	W
<i>A. cervinus</i>	W	w	w	W
<i>A. pratensis</i>	w	-	-	-
<i>Lanius collurio</i>	-	-	-	w
<i>L. minor</i>	-	-	-	w
<i>L. excubitor</i>	a	A	W	A
<i>L. senator</i>	P	W	W	W
<i>L. nubicus</i>	-	-	-	w
<i>Sturnus vulgaris</i>	w	-	-	-
<i>Saxicola rubetra</i>	P	P	w	p
<i>S. torquata</i>	w	w	a	p
<i>Oenanthe oenanthe</i>	W	W	W	W
<i>O. hispanica</i>	p	W	W	W
<i>O. deserti</i>	W	W	w	W
<i>O. isabellina</i>	-	w	w	W
<i>Monticola saxatilis</i>	-	p	-	w
<i>M. solitaria</i>	-	w	w	-

<i>Phoenicurus phoenicurus</i>	P	W	W	W
<i>P. ochruros</i>	-	w	-	-
<i>Cercotrichas galactotes</i>	p	p*	W	W
<i>Luscinia megarhynchos</i>	P	w	W	p
<i>L. svecica</i>	P	p*	W	w
<i>Locustella luscinioides</i>	-	-	w	w
<i>Acrocephalus schoenobaenus</i>	P	p*	W	W
<i>A. paludicola</i>	p	-	p	w
<i>A. scirpaceus</i>	p	p*	w	W
<i>A. arundinaceus</i>	-	p	w	w
<i>Hippolais pallida</i>	p	p*	W	W
<i>Sylvia hortensis</i>	p	W	W	w
<i>S. atricapilla</i>	W	W	w	w
<i>S. communis</i>	p	w	W	P
<i>S. curruca</i>	-	-	-	w
<i>S. melanocephala</i>	W	W	w	-
<i>S. cantillans</i>	p	W	W	W
<i>S. conspicillata</i>	w	W	-	-
<i>Phylloscopus trochilus</i>	P	P	P	w
<i>P. collybita</i>	W	W	W	W
<i>P. bonelli</i>	-	W	W	W
<i>P. sibilatrix</i>	-	-	p	w
<i>Ficedula hypoleuca</i>	p	P	w	w
<i>Emberiza calandra</i>	w	-	p	-

KEY:

Common	Scarce	Status
A	a	Observed in winter but probably of Afrotropical origin
P	p	Palaearctic passage migrant
W	w	Palaearctic winter visitor (Dec.-Jan.)
-		Not recorded
*		Will probably be found to winter in southwest Mauritania

Note: A further 38 species have been recorded as passage migrants or vagrants in at least one of these areas but are not known to winter in any of them, so do go further south or have been overlooked.

are abundant in the west near the coast, while *Maerua crassifolia* appears mainly west of 14°W. *Salvadora persica* and *Maerua crassifolia* are important berry bearing trees. Spiny vegetation (*Acacia* sp. and *Balanites aegyptiaca*) occurs right across southwest Mauritania, but is predominant in the east with the decline of non-spiny types. Humidity of the air is another factor; it steadily declines on the average as one gets further from the coast (Toupet et al. 1977).

The only Palaearctic species wintering exclusively in northern areas of southwest Mauritania (north of 17°N), *Oenanthe deserti*, is common also in northwest Mauritania but is very scarce and has only recently been recorded in Senegal (Morel 1980). In Mali it occurs south to 15°N (Lamarche 1980-81). I often saw it in association with *Sylvia conspicillata*, where the ranges of the two species overlapped.

The four species *Anthus campestris*, *Lanius senator*, *Sylvia hortensis* and *Phylloscopus bonelli* which favour southern parts of southwest Mauritania, as well as *Oenanthe oenanthe*, *O. hispanica* and *Sylvia cantillans* which are more widespread, are all common on the dry steppe in northern Senegal. The observations reported in this paper establish the known northern limits of the winter quarters of six of these species in West Africa (all except *Oenanthe oenanthe* which winters as far north as northwest Mauritania): *Oenanthe hispanica* and *Sylvia cantillans* about 18°30'N, *Anthus campestris* and *Sylvia hortensis* about 18°N, *Lanius senator* and *Phylloscopus bonelli* about 17°30'N. These seven species occur east to Mali, where northern limits in winter are given as 18°N for *Oenanthe hispanica* and 17°N for *Anthus campestris*, *Sylvia cantillans* and *Phylloscopus bonelli* (Lamarche 1980-81 and pers. comm.). For a further eight species which are scarcer or require more specialised habitats, the wintering records in southwest Mauritania appear to include the most northerly in West Africa: *Ciconia nigra* (16°26'N), *Circus pygargus* (17°07'N), *Circaetus gallicus* (17°20'N), *Hieraaetus pennatus* (16°51'N), *Streptopelia turtur*, *Riparia riparia*, *Phoenicurus phoenicurus* and *Luscinia megarhynchos* (18°04'N).

One species, *Calandrella brachydactyla*, was found to be common (especially in millet fields) in winter in southwest Mauritania east of 14°30'W, but it is considered to be a passage migrant only in northern Senegal (Morel 1972). In Mali it is common in winter south of 16°N (Lamarche 1980-81). Most ornithological work in Senegal has been carried out west of 14°30'W; it can confidently be predicted that the species will eventually be found to winter in eastern Senegal.

The common wintering of *Oenanthe o. seebohmi* in the eastern part of southwest Mauritania (Fig. 2) indicates that this is the principal wintering area of that form; for no other has been found. Lamarche (1980-81) mentions it in Mali, but only "quelques individus" and Morel (1972) has only two records for Senegal, both in April. This finding answers a question raised by Heim de Balsac in 1951 as to where this bird winters, for he had noted that they leave their breeding grounds in the Atlas mountains and had observed two specimens in April south of the breeding area, one in southern Morocco, the other in northern Mauritania. We can roughly estimate the population of this race in southwest Mauritania. East of 14°30'W, 8 out of 25 *Oenanthe oenanthe* were black-throated (compared with only 2 out of 59 west of 14°30'W). Since only the male has this plumage, that would indicate the majority in the east are *seebohmi*, with a population of at least 50,000 birds.

In view of the finding of Morel & Roux (1966) that *Oenanthe isabellina* was the commonest wheatear on 16 February 1965 80 km north of Rosso, Mauritania (around 17°10'N, 15°15'W), it is surprising that I saw so few of them, and these near Nouakchott. Possible reasons may be that I did not visit the locality concerned, that their 1965 observation was outside the December-January period and that there has been a marked climatic change since 1965. Lamarche (1980-81) reports that *O. isabellina* is the commonest wheatear north of 16°N in Mali.

It seems likely that most Palaearctic species which have been recorded as wintering regularly in northern Senegal near the frontier of Mauritania, but have not so far been recorded wintering in Mauritania, will be found eventually to winter there too. In Table 4 the 21 species concerned are marked with an asterisk. 15 species are aquatic and six non aquatic.

It is worth noting that for a number of species which breed in the Afrotropical zone as well as the Palaearctic, there is often no clear evidence of the origin of the birds observed. This may lead to assessments of status which differ among authors in neighbouring areas. For instance, my assessment of *Egretta alba* as being a Palaearctic winter visitor and *Upupa epops* as not so being in southwest Mauritania (Appendix 3) is just the opposite of the assessment of Morel (1972, 1980) in northern Senegal only a short distance away. The evidence available is different in the two countries.

The finding (Appendix 3) of passage migrants as late as 14 December (*Asio flammeus*) and as early as 20 January (*Upupa epops*) was unexpected and shows that there is only a very short time (about 5 weeks) when there was no evidence of movement of Palaearctic birds.

(b) Estimates of populations

Of 24 species seen on the natural dry steppe, only eight were evenly distributed (Table 3). If the densities of these eight species are summed within the geographical limits where each species is found, they average about 10 birds per km² at 17°N and 3 per km² at 18°30'N. The other 16 species were unevenly distributed. Excluding a roost of 500 *Streptopelia turtur*, the average density (calculated using the same assumptions regarding area searched per hour as for the evenly distributed species) of all 24 Palaearctic species is about 22 per km² at 16-17° N, 16 per km² at 17-18° N and 12 per km² at 18-19° N.

Comparable densities can be obtained from other sources. Moreau (1961 and 1972) estimated that about 155,000 birds migrate from the Palaearctic into Africa per km of longitude. If we assume that these birds winter from the southern edge of the Sahara to the Gulf of Guinea the distance is 1,600 km; this gives an average density of Palaearctic winter visitors to tropical West Africa of around 97 birds per km². Elgood *et al.* (1966) estimated in a similar way about 200 per mile² or 77 per km² for Nigeria. These figures are averages based upon quite general assumptions. Confirmation of their validity for northern areas derives from seven counts of Palaearctic birds on a 0.25 km² study area of bush savanna at Fété-Olé in northern Senegal (16°13'N, 15°06'W) in December and January between 1969 and 1979 (G.J. and M.Y. Morel, pers. comm.). These give 99 ± 30 (95% confidence limits) birds per km².

These three estimates of 77-99 birds per km² are about four times higher than my estimate for the part of Mauritania lying only slightly north of the counts made by the Morels. This may be partly accounted for by the difference in techniques. We both used visual counts. However, they did an exhaustive census of a small area by three observers. I counted the birds I saw during steady walks at about twice their speed (c. 3.6 km/hr instead of 1.7 km/hr), and assumed I could detect all birds present within a certain distance. This assumption was based upon measurements of the distance at which I first detected birds in the vicinity of Nouakchott, on very lightly vegetated steppe. The further south one goes, the denser the vegetation because of increased rainfall. Approximate rainfall annual averages are (Toupet et al. 1977): 16-17°N 300 mm, 17-18°N 200 mm, 18-19°N 100 mm. I think it is likely that my density estimates for a given species are quite realistic in the 18-19°N zone, but too low by a factor of 2 or 3 at 16-17°N. This implies that the population of eight evenly spread species is about 2,000,000 instead of 1,000,000 in southwest Mauritania. Unevenly spread species are not included in this estimate; these apparently are as numerous as the evenly spread species. Also I have excluded because of insufficient evidence of Palaearctic origin (Appendix 3) *Cursorius cursor*, *Upupa epops* and *Lanius excubitor* which occurred in numbers on the dry steppe and which are considered Palaearctic winter visitors to Senegal (Morel 1972). Thus the total Palaearctic wintering population could well be of the order of 5 million birds.

The records of Tréca and Roux, obtained by aerial survey on 6 December 1975, show how difficult it is to estimate the population of water birds in southwest Mauritania. This is because of the huge variation in the numbers found on a given body of water. For instance, 44,900 Pintail *Anas acuta* were counted on that day. The species was found on only six of the 22 lakes inspected, in the following numbers:- 35,000, 8,000, 1,000, 500, 300, 100. Yet, during a previous aerial survey on 5 November 1975 of the same lakes, only 4,475 were present and the numbers on the same 6 lakes respectively were:- 0, 0, 250, 0, 0, 0. The bodies of water in Mauritania form part of a system which also includes lakes, marshes and irrigated areas in Senegal (not included in the figures for the Pintail quoted above); conditions can change quite rapidly as lakes dry out or according to irrigation needs. This must cause large movements of birds between aquatic habitats in the two countries, making calculation of wintering populations in Mauritania alone rather meaningless.

Even though the number of species of water birds wintering in southwest Mauritania probably exceeds that in the northwest, it seems clear that southwest Mauritania does not rival northwest Mauritania as a wintering ground for these birds, where the population is estimated of the order of 1,000,000 (Trotignon 1980). However, the population of birds of the steppe in southwest Mauritania exceeds that number, probably by several times.

ACKNOWLEDGEMENTS

I would like to thank Dr J.F. Monk for valuable comments on this paper, Dr J.C.O. Harrison for examining slides of *Saxicola torquata*, Mr B. Treca, Mr F. Roux, Dr G.J. Morel and Dr M.Y. Morel for making available to me unpublished data.

RESUME

Cette étude sur les oiseaux paléarctiques cantonnés dans le sud-ouest de la Mauritanie a été menée au cours des mois de décembre et janvier 1978, 1979, 1980, 1981 et Jan. 1982. 78 espèces furent identifiées par l'auteur et 5 (principalement des espèces aquatiques) par d'autres personnes. La densité des oiseaux terrestres cantonnés sur la steppe (surtout des passereaux) a été estimée à 12 oiseaux au km² au nord et au moins à 22 oiseaux au km² au sud; l'effectif a été estimé entre 2 et 5 millions. Les espèces trouvées étaient en général les mêmes que celles observées dans les régions avoisinantes: nord du Sénégal, nord-ouest de la Mauritanie et centre du Mali. Cependant, de nouveaux quartiers divers furent découverts pour *Oenanthe oenanthe seebohmi*, *Sylvia melanocephala* et *Sylvia conspicillata* tandis que les limites septentrionales approximatives de quartiers d'hivers en Afrique de l'Ouest furent établies pour 14 espèces.

REFERENCES

- ASH, V.S. & POMEROY, D.E. (1981) Mapping schemes in the Afrotropical Region. *Ibis* 123: 552-3
- BROWNE, P.W.P. (1981) Breeding of six Palaearctic birds in southwest Mauritania. *Bull. B.O.C.* 101(2): 306-310
- DE SMET, K. & VAN GOMPEL, J. (1980) Observations sur la Côte sénégalaise en décembre et janvier. *Malimbus* 2: 56-70
- HEIM DE BALSAC, H. & T. (1949-51) Les migrations des oiseaux dans l'ouest du continent africain. *Alauda* 17-18: 129-143, 206-221; 19: 19-39, 97-112, 157-171, 193-210
- HEIM DE BALSAC, H. & MAYAUD, N. (1962) *Les Oiseaux du Nord-Ouest de l'Afrique*. Editions Paul Lechevalier, Paris
- LAMARCHE, B. (1980-81) Liste commentée des oiseaux du Mali. *Malimbus* 2: 121-158; 3: 73-102
- MOREAU, R.E. (1961) Problems of Mediterranean-Saharan migration. *Ibis* 103a: 373-427, 580-623
- MOREAU, R.E. (1972) *The Palaearctic-African Bird Migration System*. Academic Press, London & New York
- MOREL, G.J. (1972) *Liste Commentée des Oiseaux du Sénégal et de la Gambie*. ORSTOM, Dakar
- MOREL, G.J. (1980) *Liste Commentée des Oiseaux du Sénégal et de la Gambie, Supplement No 1*. ORSTOM, Dakar
- MOREL, G.J. & M.-Y. (1978) Recherches écologiques sur une savane sahélienne du Ferlo septentrional, Sénégal. Etude d'une communauté avienne. *Cah. ORSTOM Sér. Biol.* 13(1): 3-34
- MOREL, G.J. & M.-Y., ORSTOM, personal communication
- MOREL, G.J. & ROUX, F. (1966) Les migrateurs paléarctiques au Sénégal. *La Terre et la Vie* 20: 19-72, 143-176

Appendix 1

Latitude and longitude of localities and hours spent at each

Locality no.	N	W	Hours	Locality no.	N	W	Hours
A01	1615	1624	0.7	B10	1805	1557	0.5
A02	1639	1601	0.1	B11	1805	1558	0.6
A03	1640	1602	1.6	B12	1806	1559	4.9
A04	1644	1605	0.8	B13	1806	1601	3.2
A05	1651	1606	4.0	B14	1807	1559	4.6
A06	1656	1615	0.3	B15	1810	1554	4.8
A07	1701	1605	0.9	B16	1822	1544	0.8
A08	1702	1403	1.2				
A09	1703	1605	1.0	CO1	1709	1212	2.3
A10	1709	1212	4.0	CO2	1710	1212	1.5
A11	1711	1604	0.3	CO3	1715	1218	1.0
A12	1718	1343	1.5				
A13	1721	1423	2.2	DO1	1804	1602	1.6
A14	1721	1604	2.1	DO2	1805	1602	0.5
A15	1726	1320	1.4				
A16	1731	1435	2.2	EO1	1622	1622	0.1
A17	1732	1559	1.7	EO2	1623	1620	0.3
A18	1734	1254	1.1	EO3	1626	1620	0.3
A19	1736	1245	0.5	EO4	1646	1618	0.5
A20	1737	1449	1.3	EO5	1753	1602	1.7
A21	1738	1238	2.3	EO6	1756	1602	1.4
A22	1746	1506	1.1	EO7	1804	1602	3.2
A23	1747	1558	1.1	EO8	1806	1602	1.0
A24	1754	1525	1.0	EO9	1807	1602	1.1
A25	1801	1545	1.6				
A26	1802	1558	1.6	FO1	1613	1625	1.0
A27	1815	1550	2.0	FO2	1803	1601	0.5
A28	1833	1540	0.1	FO3	1805	1559	3.6
A29	1842	1537	1.2	FO4	1805	1602	4.1
A30	1846	1535	1.2				
				GO1	1632	1548	2.3
B01	1634	1618	0.5	GO2	1633	1548	2.0
B02	1703	1355	0.1	GO3	1636	1555	0.4
B03	1724	1324	0.7	GO4	1702	1356	0.5
B04	1725	1234	0.3	GO5	1707	1404	1.9
B05	1729	1306	1.0	GO6	1715	1220	1.0
B06	1751	1508	1.0	GO7	1720	1340	0.8
B07	1757	1528	0.3	GO8	1735	1250	1.6
B08	1758	1531	1.3	GO9	1804	1559	18.1
B09	1804	1556	1.0				

Appendix 2

Localities at which each species was observed

Sula bassana D01 O2, *Egretta alba* E03 G01, *E. garzetta* E01 G01, *Ardea cinerea* E01 O2 O3 G01 O2 O4 O6, *Ciconia ciconia* G01, *C. nigra* E03, *Plegadis falcinellus* G05, *Anas acuta* E05 F02 G06 O9, *A. querquedula* G02 O5 O6 O8 O9, *A. clypeata* G02 O6, *Gyps fulvus* A03, *Neophron percnopterus* B01 C02 G07, *Circus macrourus* A17, *C. pygargus* E04 G01 O2 O5, *C. aeruginosus* G01 O2 O5 O6, *Circaetus gallicus* C03 G07, *Buteo rufinus* A29 F02, *Hieraaetus pennatus* A05 G01, *Milvus migrans* A03 O5 16 B01 O9 12 13 14 E02 O7 F02 O3 O4 G01 O2 O4 O7 O9, *Falco peregrinus* B11 C02 G07, *F. tinnunculus* A03 O8 12 13 25 B05 11 13 F03 G02 O4 O7 O8 O9, *Coturnix coturnix* G05, *Pluvialis squatarola* E05 O7 F04, *Charadrius hiaticula* E05 O6 O8 F01 O2 O4 G09, *C. dubius* F01 O3 G01 O2 O4 O9, *Limosa lapponica* E05 F04, *Tringa nebularia* G01 O2, *T. stagnatilis* G01 O2 O4 O6 O7, *T. glareola* G01 O2 O5 O6 O8, *T. ochropus* G01 O2 O6, *T. hypoleucos* F01 G03 O6, *T. totanus* E05 F02 G01 O2 O6, *T. erythropus* G01 O2 O5 O6, *Arenaria interpres* E05 F04, *Gallinago gallinago* G01 O5 O9, *Calidris canutus* E05 O6 F01 O4, *C. alpina* E04 O5 F01 O2 O4 G01, *C. ferruginea* E05 F02 O4, *C. minuta* E04 O5 O6 F01 O2 G01 O2 O4 O5 O6 O7, *C. temminckii* G04, *C. alba* E05 O7 O8 F04, *Philomachus pugnax* F02 G01 O2 O5 O6, *Haematopus ostralegus* E07 F04, *Recurvirostra avosetta* E05 F02 G02, *Larus ridibundus* E04 O5 O6 O8 F04 G04 O7, *L. fuscus* E03 O7 O8 F04, *Sterna sandvicensis* D01 O2, *Streptopelia turtur* A12 G07 O9, *Apus melba* G08, *Calandrella brachydactyla* A13 B03 O4 G05 O8, *Riparia riparia* G01 O2 O4 O5 O9, *Hirundo rustica* B05 O7 O8 O9 11 12 13 15 E05 O9 F03 O4 G01 O6 O7 O8 O9, *H. obsoleta* B12 C02 G09, *Delichon urbica* B11 12 F04, *Motacilla flava* A01 B04 O5 E05 F03 O4 G01 O2 O5 O7 O8 O9, *M. cinerea* G09, *M. alba* A09 13 25 26 B02 O5 O6 10 11 12 13 14 15 E02 F01 O2 O3 O4 G01 O2 O3 O4 O9, *Anthus campestris* A06 O8 13 B03 O4 O5 G07 O8 O9, *A. trivialis* G01 O9, *A. cervinus* G09, *Lanius senator* A03 O5 O7 O8 10 13 G02 O5 O6, *Saxicola torquata* G09, *Oenanthe oenanthe* A04 O5 O7 O8 10 12 13 15 16 17 25 26 B03 O5 12 13 15 E06 F03 O4 G01 O2 O3 O4 O7 O8 O9, *O. hispanica* A05 O7 O8 13 14 15 16 17 20 22 23 24 25 B03 O4 O6 12 F02 G03 O6 O9, *O. deserti* A15 18 19 21 22 23 24 25 27 29 30 B06 O8 12 13 14 15 16 E06 O9 F03 O4, *O. isabellina* B13 15 F03, *Monticola solitaria* B12 C01, *Phoenicurus phoenicurus* A03 O5 12 F04 G09, *P. ochruros* F04 G09, *Luscinia megarhynchos* G09, *Sylvia hortensis* A01 O3 O4 O5 O7 13 14 18 24, *S. atricapilla* A05 17 B08 12 14 F04 G03 O9, *S. communis* A01, *S. melanocephala* A13 27 B11 12 13 14 15 E05 O7 F03 O4 G09, *S. cantillans* A01 O3 O5 O6 O8 10 12 13 14 16 18 23 B05 12 13 14 16 E04 F01 G05 O9, *S. conspicillata* A04 O7 13 17 20 23 25 27 29 B13 14 F03, *Phylloscopus collybita* A03 17 B06 O8 11 13 14 16 F03 O4 G09, *P. bonelli* A03 O4 O5 O7 10 12 13.

Appendix 3

Evidence for including and excluding certain species

1. Confirmation of identity of three species

12 x 40 binoculars were used.

Hirundo obsoleta: observed at Nouakchott perched on ledges of unfinished houses at a range of c. 10 metres - grey-brown above with white spots on tail, pale buff below with whitish unstreaked throat.

Sylvia conspicillata: distinguished from Whitethroat *S. communis*, which also has a rufous wing patch, white on sides of tail, grey head and whitish eye-ring, by call - a sharp rattling "trrrrrrt" - and active flitting behaviour, flying from bush to bush (Sharrock 1962). Also the season was different: Spectacled Warblers were seen only from 16 November to 21 February, whereas Whitethroats were netted in a garden at Nouakchott 29 March-25 April and 19 September-25 October (nets set 27 January-13 June and 15 September-29 November). No Spectacled Warbler was netted (they did not come into the gardens), but one was shot by Mr C. Lasausse (in my company) near Nouakchott on 7 February 1982. Identity confirmed by wing 57-58 mm, emarginated 3rd-6th primaries, rufous patch on wing (Williamson 1976b). The specimen was deposited in the collection of ORSTOM at Richard-Toll, Senegal.

Phylloscopus collybita: my impression, based on appearance, that no Willow Warblers *P. trochilus* were present in winter was confirmed by examination of birds caught in the nets referred to above - 24 Chiffchaffs between 27 January and 18 May and on 21 October and 37 Willow Warblers between 22 March and 3 June (identification based on Williamson 1976a). Also Chiffchaffs were heard in song at Nouakchott from December to April whereas Willow Warbler song was heard only in April and May.

2. Palaearctic species which breed in or near Mauritania

26 species which breed in or near Mauritania as well as further north (Browne 1981, Heim de Balsac & Mayaud 1962, Morel 1972, 1980) were seen in winter in southwest Mauritania.

For six species there was direct evidence of migration from the north. *Egretta alba*, *Ardea cinerea* and *Calandrella brachydactyla* were observed flying north in spring or south in autumn near Nouakchott (well away from breeding areas). For three species, Palaearctic races were identified. *Milvus migrans*: all birds observed closely in December and January had black beaks. In addition two found dead on 17 January 1981 had black beaks and a wing length of 470 and 483 mm (upper limit of local race *tenebrosus* is 454 mm, Mackworth-Praed & Grant 1970). *Falco tinnunculus* was observed over flat steppe, whereas the local race *rufescens* is confined to rocky areas (Serle & Morel 1979). *Saxicola torquata*: a male photographed at Nouakchott in November 1981 had the characteristics of the west European race *torquata* rather than of any of the African or eastern races - the whole underparts were rufous without a white belly and the mantle was dark brown striped instead of being black (confirmed by Dr J.C.O. Harrison *in litt.*).

For the other species, the evidence is indirect, and based upon seasonal presence or absence. The abundance rating (scale given in Figure 2) of each of 24 species in two month periods (first letter of months used) during the year over the whole of southwest Mauritania was as follows:

	F,M	A,M	J,J	A,S	O,N	D,J	
<i>Ardeola ralloides</i>	1	1	1	1	1	1	
<i>A. ibis</i>	4	6	5	5	5	5	
<i>Egretta alba</i>	2	1	-	1	1	4	W
<i>E. garzetta</i>	2	1	-	2	3	3	W
<i>Ardea cinerea</i>	4	3	1	2	3	4	W
<i>Plegadis falcinellus</i>	-	-	-	3	3	3	W
<i>Falco biarmicus</i>	-	1	1	1	1	1	
<i>F. peregrinus</i>	-	-	-	-	1	1	W
<i>Charadrius alexandrinus</i>	5	5	4	4	4	4	
<i>Cursorius cursor</i>	3	4	4	3	3	5*	
<i>Pterocles senegallus</i>	1	5	5	2	6	4	
<i>Upupa epops</i>	5	5	4	5	3	3	
<i>Alaemon alaudipes</i>	4	4	4	3	4	4	
<i>Ammomanes cincturus</i>	2	3	3	2	2	3	
<i>Calandrella brachydactyla</i>	6	2	-	3	6	6	W
<i>Galerida cristata</i>	5	5	5	5	5	5	
<i>Hirundo obsoleta</i>	-	-	-	-	2	2	W
<i>Lanius excubitor</i>	3	2	3	4	4	4	
<i>Corvus ruficollis</i>	5	4	6	4	5	4	
<i>Saxicola torquata</i>	1	-	-	-	1	1	W
<i>Oenanthe deserti</i>	3	1	-	2	4	4	W
<i>Sylvia conspicillata</i>	2	-	-	-	2	3	W
<i>Rhodopechys githaginea</i>	5	4	4	4	4	2	
<i>Passer simplex</i>	4	2	4	1	4	5*	

* high value because of one large flock

A peak in the column D,J indicates that the species is probably a winter visitor. Ten species believed to have this status have a W in the last column. For the other 14 species, I believe the evidence of Palaearctic origin to be insufficient. As shown below, there was reason to think that *Upupa epops* was on migration at Nouakchott in December and January. Hoopoes were also seen further south, but in two cases song was heard, indicating the local race *senegalensis*, which breeds in southwest Mauritania (nest at 16°44'N, 16°05'W, 11 July 1978).

3. Probable passage migrants

Ten species seen at Nouakchott in December and January were observed only during either the first three days of December or the last two days of January. These have been excluded as being probable late autumn or early spring migrants (indicated respectively by A and S): *Nycticorax nycticorax* (A), *Ardea purpurea* (A), *Pandion haliaetus* (A), *Gallinula chloropus* (A), *Vanellus vanellus* (A), *Numenius arquata* (A), *Sterna*

hirundo (A), *Saxicola rubetra* (A), *Locustella naevia* (S) and *Hippolais pallida* (S). Also the only example of *Asio flammeus* was one flying south along the shore at Nouakchott on 14 December 1979. *Upupa epops* was not observed at Nouakchott between 3 December and 20 January, though they were common just before and just after that period, presumably on passage. Records of *Calandrella brachydactyla* on and before 6 December are excluded because birds were seen flying south near the coast up to that date.

REFERENCES *cont. from p. 87*

- MOREL, G.J. & ROUX, F. (1973) Les migrateurs paléarctiques au Sénégal, Notes complémentaires. *La Terre et la Vie* 27: 523-550
- PETETIN, M. & TROTIGNON, J. (1972) Prospection hivernale au Banc d'Arguin (Mauritanie). *Alauda* 40: 195-213
- ROUX, F., MAHEO, R. & TAMISIER, A. (1978) L'exploitation de la basse vallée du Sénégal (quartier d'hiver tropical) par trois espèces de canards paléarctiques et éthiopiennes. *La Terre et la Vie* 32: 387-416
- SHARROCK, J.T.P. (1962) The field identification of Sardinian, Subalpine and Spectacled Warblers in autumn. *British Birds* 55: 90-92
- TOUPET, C., LACLAVERE, G. & MONOD, T. (1977) *Atlas de la République Islamique de Mauritanie*. Editions Jeune Afrique, Paris
- TRECA, B. ORSTOM & ROUX, F. CRBPO, Paris. Personal communication
- TROTIGNON, J. (1980) *Parc National du Banc d'Arguin. Comptes-Rendus d'Activités Scientifiques* (Oct. 77-Fév. 79). Nouadhibou
- WILLIAMSON, K. (1976a) *Identification for Ringers The Genus Phylloscopus*. B.T.O. Tring
- WILLIAMSON, K. (1976b) *Identification for Ringers The Genus Sylvia*. B.T.O. Tring

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THE BIRDS OF CONAKRY AND KAKULIMA, DEMOCRATIC REPUBLIC OF GUINEE

by D. K. Richards

Received 21 May 1982

As far as I know, the birds of Conakry and Kakulima have not been documented, although I have not been able to search the pre-independence literature fully.

I lived in Conakry from mid December 1979 to mid May 1980 and again from November 1980 to February 1981. Security in Guinée is very strict, although this is now being relaxed to some extent; most of my early records were made without the use of binoculars (their use was forbidden). In cases where I consider the identification less than certain, I have marked the species '+'; other species whose identification is not positive are placed in square brackets. A total of 178 species are listed below.

CLIMATE

During the months of my stay in Guinée the weather was humid and mostly overcast, with visibility severely limited at times. The temperature was always in excess of 30°C and the only rain experienced was on the evening of 25th April 1980.

I did not reside in the area during the rain season; and in the early part of my stay, travel around Conakry was greatly hampered due to security restrictions. Thus I am sure many species will have been missed; hopefully, with the more relaxed security conditions coming into effect, a more thorough coverage of the area will soon be possible.

CONAKRY

The city of Conakry is situated on the end of a rocky peninsular which extends 14 km out to sea. The city itself is heavily populated and dense suburbs stretch as far as the airport on the southern coast, and for 10 km along the northern coast. The centre of the peninsular is formed by higher ground consisting of rocky ironstone country with scant vegetation and a low human population.

The following places are marked on the map (Fig. 2) and are where most of the birds recorded were seen.

Botanical Gardens (A) - These gardens, situated in the suburb of Camayenne, are not maintained and many trees have been felled. The Forestry Department has an office there and part of the Gardens is used for rearing seedlings. Next to the Gardens there is the Colonial Cemetery, almost completely over-

grown, but a rewarding birdwatching area.

Dabondi (B) - A heavily populated suburb on the southern coast with a small muddy bay fed by a small tree-lined creek.

Airport (C) - A typical airport. There are areas of long grass which, when dry, are harvested by the local population for bedding. The airport is bordered on the north by irrigated cultivation and on the south by a mangrove creek.

Airport Creek (D) - A tidal mangrove creek with a small area of mud exposed at low tide. Between the mangroves and the airport the area is scrub with a few tall trees.

Bare Hillside (E) - This ironstone area in the centre of the peninsular has already been noted.

Kipe (F) - A village and suburbs on the northern coast where I lived in February 1981.

Sangareya Bay (G) - Here restricted to the area of mudflats near the village of Lembagui; a very important feeding area for herons and Palaearctic waders.

Marshy Area (H) - An unnamed fresh-marsh alongside the airport road.

Fresh-water Marsh and Pools (I) - Also unnamed, near the village of Fosside.

Sparse Woodland (J) - Near Fosside.

Kakoulima (not shown on map) - A prominent hill rising to 1000 m a.s.l., 50 km NE of Conakry. There is a track normally only suitable for 4-wheel drive vehicles almost to the top. The upper third of the hill is heavily forested while the lower third has been cleared; the intermediate third is in the process of being cleared. The area would make an ideal first national park for Guinée and, in any case, should be preserved. Not only is tree-felling rampant but many local people roam the area carrying modern automatic rifles. Apart from birds there are also Chimpanzees *Pan troglodytes* and various species of monkey in the forest. Unfortunately I was only able to visit the area twice during my stay in the country.

SYSTEMATIC LIST

Scientific and English names and sequence follow Serle & Morel (1977).

Pelecanus rufescens Usually present off shore.

Phalacrocorax africanus Usually seen on small fresh water pools outside the city, e.g. at H and I, but occasionally at Sangareya Bay (G).

Phalacrocorax carbo lucidus Quite common at Sangareya Bay (G) but some always present at other sites scattered along the coast.

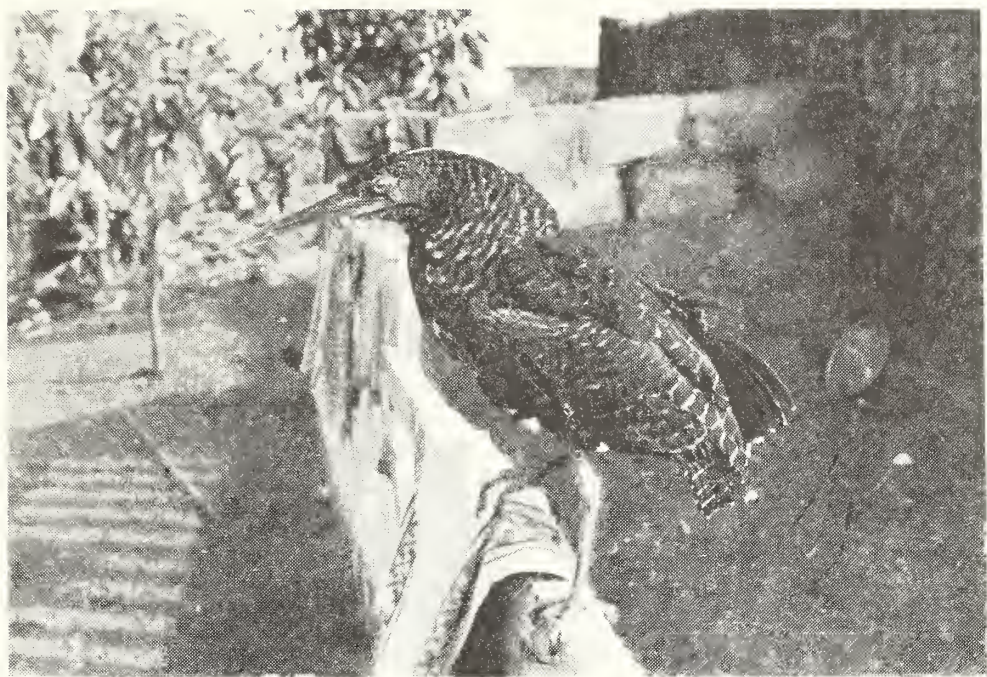


Figure 1 White-crested Bitter (Tiger Bittern) *Tigriornis leucolopha*.
See text. Photo D.K. Richards

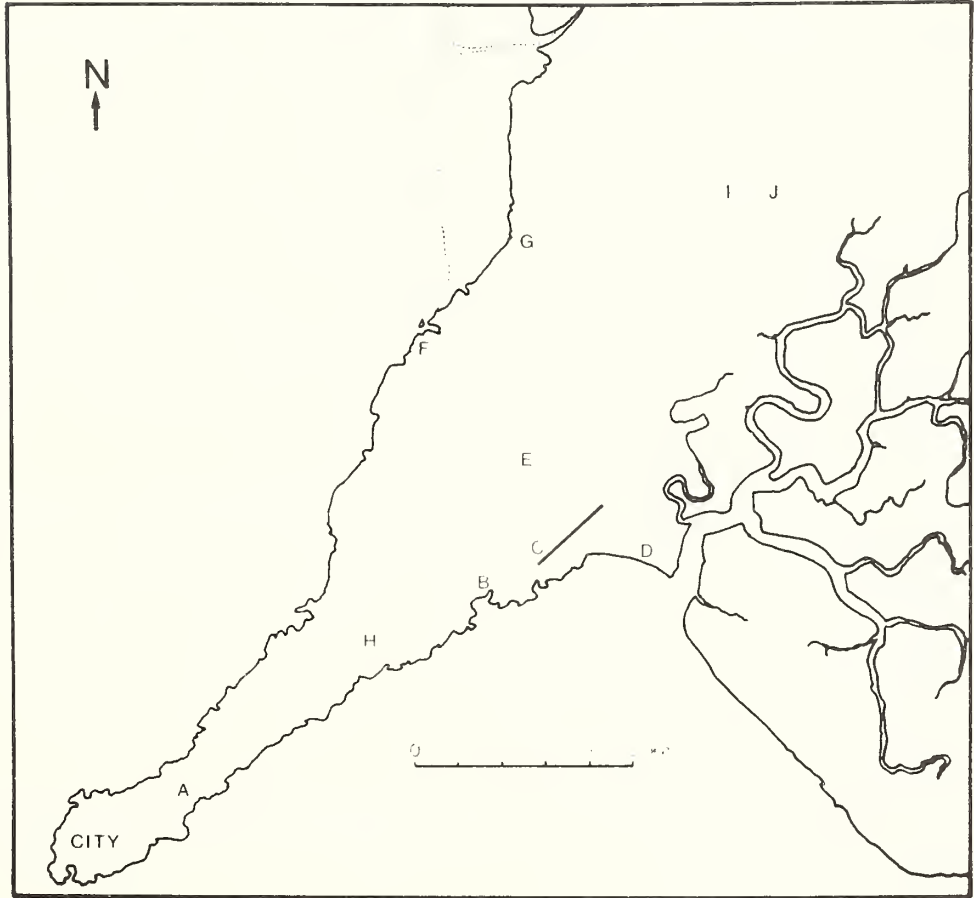


Figure 2 Environs of Conakry. A-J, see text.

- Ixobrychus sturmi* Only seen once at the small marsh H along the airport road, on 25 Feb 1980.
- Tigriornis leucolophus* (Fig. 1) One captured by fishermen in Jan 1980 at Dixinn; three kept as pets by a Guinée family near the airport in Mar and Apr 1980; one seen at the airport creek D in Nov 1980.
- Nycticorax nycticorax* Odd birds seen occasionally in Sangareya Bay but on 15 Feb 1981 several hundreds were disturbed from a roost there.
- Ardeola ralloides* Occasionally seen at H.
- Ardeola ibis* Common, even in the city feeding on rubbish heaps.
- Butorides striatus* Always present in Sangareya Bay.
- Egretta ardesiaca* A few always present in Sangareya Bay and odd birds seen at other suitable localities.
- Egretta alba* Very common in Sangareya Bay with as many as 220 seen feeding together in Apr 1980.
- Egretta intermedia* Two on 17 Feb 1981 at G is the only record for this species.
- Egretta garzetta* Not very common: mainly seen at H but a few also seen feeding in Sangareya Bay with the next species.
- Egretta gularis* Common, found all along the coast but more particularly at G.
- Ardea cinerea* A few always present at G and odd birds seen at other sites from time to time.
- Ardea goliath* Occasionally single birds at G and on the Airport Creek (D).
- Ardea purpurea* One immature at D on 25 Mar 1980 and an adult at G on 5 Feb 1981 are my only records.
- Scopus umbretta* Occasionally seen in the Airport area.
- Ibis ibis* Uncommon, only observed at Sangaria Bay (G), maximum 7; all sightings in Feb 1981.
- Threskiornis aethiopica* Occasionally at G but never more than 3 or 4 at one time.
- Platalea alba* Occasionally seen at G.
- [*Platalea leucorodia* A possible seen at G on 5 Feb 1981 feeding far out on the mud flats; an immature seen there on 18 Feb 1981 was almost certainly this species.]
- Phoenicopterus ruber* Occasionally seen at G but common elsewhere along the Guinée coast.
- Neophron monachus* Very common in Conakry city.
- Gypohierax angolensis* Occasionally seen in the area although quite common along the Guinée coast (once five counted during a 160 km flight).

- Circus aeruginosus* Occasionally seen at G.
- Accipiter toussenellii* One seen at A on 13 Apr 1980.
- Accipiter badius* Seen several times in the city; a pair resident at A and a pair with a juvenile in Apr at Dabondi (B).
- Kaupifalco monogrammicus* One seen inland from Sangaria Bay on 7 Feb 1981.
- Stephanoaetus coronatus* A pair at Kakulima, 9 Feb 1981.
- Hieraaetus dubius* One at Kakulima, 17 Nov 1980 and another there on 9 Feb 1981.
- Haliaetus vocifer* Seen occasionally. Two immatures at G in Mar 1980.
- Milvus migrans* A few pairs resident in the city and at the airport.
- Elanus caeruleus* A pair resident at the airport.
- Pandion haliaetus* Occasionally observed, during the months I was resident in Conakry.
- Falco cuvieri* Twice at Sangaria Bay, 15 and 17 Feb 1981.
- Falco chicquera* Two records, both in palms: at Sangaria Bay 17 Feb 1981 and at the airport 7 Feb 1980.
- Falco ardosiaceus* Two records from the airport, 13 Feb and 5 Nov 1980.
- Francolinus bicalcaratus* Present in scrub at the Airport Creek.
- Ptilopachus petrosus* Probably resident in the area of E (Hendrick Jacobs, pers. comm.).
- Numida meleagris* A flock of guinea-fowl disturbed in secondary growth on Kakulima were assumed to be of this species; domesticated birds often kept in villages near Conakry.
- [*Crex crex* A large brown crane, with long dangling legs, disturbed in long wet grass at Airport, 16 Nov 1980, was possibly this species.]
- Actophilornis africana* One on a fresh water pool at I on 19 Nov 1980.
- Burhinus oedicnemus* One on 18 Feb 1981 at G was seen with other Palaearctic waders. Good views obtained of the wing-pattern.
- Burhinus senegalensis* Small group at the Airport in Feb 1980.
- Vanellus lugubris* Present at the Airport where their behaviour suggested breeding. A chick, possibly of this species, was found there in Apr 1980.
- Vanellus senegallus* Found occasionally at low tide in area D.
- Pluvialis squatarola* Seen almost everywhere along the coast, even in the city; most numerous at G where, in Apr 1980, many were in breeding plumage.

- Charadrius hiaticula* Seen almost everywhere along the coast, even in the city. Most common in Apr.
- Charadrius forbesi* Often found at the Airport and most often seen at dawn.
- Numenius phaeopus* Present at all suitable areas, even in the city; most common at G.
- Limosa limosa* At times very common in flocks at G; one flock in Feb 1981 contained over 300 birds.
- Limosa lapponica* Small numbers seen occasionally at D and G.
- Tringa nebularia* Always present in numbers, and occasionally in flocks of 100 at D and G, during Feb and Mar.
- Tringa stagnatilis* A few usually present at G and occasionally at D.
- Tringa glareola* Sometimes present in irrigation ditches at the Airport; one record from G.
- Tringa ochropus* Often present in irrigation ditches at the Airport and in the marshy area next to the nearby Hotel Gbessia.
- Tringa hypoleucos* Most often found at G roosting in the mangroves at high tide but some birds always present at all other coastal sites.
- Tringa totanus* Usually found in flocks, often with *T. nebularia*, at D and G.
- Tringa erythropus* Several recorded at G in Apr 1980 among a mixed flock of waders.
- Arenaria interpres* A few (5-10) occasionally at G but odd birds seen at other places along the coast.
- Calidris alpina* Usually present at G in small numbers.
- Calidris ferruginea* Uncommon, but numbers increase from mid Mar while in Apr many are in full breeding plumage.
- Calidris minuta* Seen all round the coast, most common at G.
- Philomachus pugnax* Several disturbed from a flooded rice field near G on 5 Feb 1981 is the only record.
- Himantopus himantopus* Occasionally 2-3 at G and also recorded on mud flats near the docks in the city.
- Recurvirostra avosetta* Very common, at times several thousands, in G 7 and 18 Feb 1981 and suspected of roosting at high tide on the Iles de Los.
- Glareola pratincola* Sometimes present at G and about 20 seen flying over the Airport at dawn on 27 Apr 1980. Large flocks have been seen from the air on 8 Feb 1980 just north and south of Conakry, outside the area covered here.

Larus cirrocephalus A few usually at G.

Larus sabini About 20 seen on 30 Nov 1980 off F. The distinctive wing-pattern was seen as well as the dipping flight.

Larus fiscus Single birds seen occasionally at F and G.

[*Larus argentatus* Five gulls, possibly this species, seen resting on the sea at G on 18 Feb 1980.]

Rynchops flavirostris One at G in Feb 1980.

Sterna nilotica The commonest tern in the area: always present at G and at most other coastal sites.

Sterna caspia A few always present at G and also seen at most other coastal sites.

Sterna hirundo Occasionally seen at G during Feb 1981.

Sterna maxima Occasionally seen at any coastal site but most often at G.

[*Sterna sandvicensis* Two terns, possibly this species, seen at sea off G in Mar 1980.]

Sterna leucoptera A small flock in Apr 1980 at G.

Sterna hybrida Small flocks at G in Mar and Apr.

Sterna albifrons Occasional at G.

Streptopelia semitorquata Seen at A and in mangroves at G.

Streptopelia senegalensis Common throughout the area.

Turtur tympanistria Heard calling in the forest on Kakolima Hill.

Turtur afer Seen occasionally in scrub at G, A and on Kakolima.

+*Turtur abyssinicus* A small black-billed dove, possibly this species, seen in the Airport Creek area in Apr 1980.

Poicephalus senegalus Seen occasionally at Kipe.

Tauraco persa Seen on Kakolima Hill (Hendrick Jacobs, pers. comm.).

Crinifer piscator Seen once at A on 30 Mar 1980 and once at Kipe on 2 Feb 1981.

Clamator jacobinus Occasionally recorded in bush on the outskirts of the city and also in private gardens in the city.

Chrysococcyx caprius Calling in the Airport area throughout Nov 1980.

Centropus senegalensis Several pairs in A and the adjacent cemetery but also occurs in city suburbs such as B and at Kakolima Hill.

- Tyto alba* Three roosted in a hanger at the Airport during Mar 1980.
- Caprimulgus climacurus* Present in scrub in the Airport Creek area during Feb to May.
- Macrodipteryx longipennis* As previous species but also seen throughout the whole area.
- [*Apus aequatorialis* A very large brown swift seen over Kakolima in Nov was thought to have been this species.]
- Apus apus* Seen over Kakolima in Nov 1980 and Feb 1981.
- Apus affinis* Several small colonies in the city and one near the Airport.
- Cypsiurus parvus* Present in the city where there are palms.
- Ceryle maxima* Two records in Mangrove Creek near the Airport, on 16 Nov 1980 and 8 Apr 1980.
- Ceryle rudis* The commonest kingfisher, found on the coast and in creeks.
- Alcedo cristata* Always present at Sangaria Bay (G), and once feeding in spring at the Hotel Gbessia near the Airport.
- Ceyx picta* Once at the Botanical Gardens (A), on 22 Feb 1980.
- Halcyon senegalensis* Occasionally near Airport (C).
- Halcyon malimbica* Usually present in mangroves at Sangaria Bay (G); also a pair resident by a small creek in the city suburb of Daboni (B).
- Halcyon leucocephala* Pair resident at the Hotel Gbessia, near the Airport.
- Merops superciliosus* Occurs at Airport Creek and Sangaria Bay (G), feeding from mangroves, Feb-Apr 1980 and Feb 1981.
- Merops albicollis* Occurs in the same areas as the previous species but feeds from trees. Many juveniles/immatures in Feb 1981. Adults only Mar 1980.
- Merops pusillus* Very scarce, only two sightings: Sangaria Bay 30 Mar 1980 and Airport Creek 27 Apr 1980.
- [*Coracias abyssinica* A roller flying over the Airport in Nov 1980 was thought to have been this species.]
- Eurystomus glaucurus* Pair seen in tall trees near Yalaya Dam (I), 27 Apr 1980.
- Eurystomus gularis* One in the Botanical Gardens, 9 Mar 1980.
- Tockus fasciatus* Common on lower slopes of Kakoulima.
- Pogoniulus chrysoconus* Seen twice in scrub near the Airport (C), 28 Mar and 8 Apr 1980.

- Campethera nivos* One seen at Kakoulima in Feb 1981 in secondary forest.
- Mesopicos goertae* In scrub near the Airport (C) 8 Apr 1980, also three immatures in mangroves at Sangaria Bay (G), Feb 1981.
- Mirafra africana* Resident at the Airport.
- Galerida modesta* Resident at the Airport but found in drier, sandier places than the previous species.
- Hirundo rustica* Surprisingly, only small numbers seen.
- Hirundo smithii* Occasional, especially inland from Sangaria Bay.
- Hirundo abyssinica* Occasional anywhere in the area.
- Delichon urbica* Small flock flying high over the city in Jan 1980, also at Kakoulima on 9 Feb 1981.
- Psolidoprocne obscura* Several pairs at Kipé.
- Psolidoprocne nitens* Occurs on Kakoulima.
- Motacilla flava* Seen from Feb onwards, mostly females and immatures; in mid Apr 1980 hundreds flew over the Hotel Gbessia at dusk.
- Motacilla aguimp* Occasionally seen in the Airport area.
- Motacilla alba* Two seen at C, Jan 1982.
- Macronyx croceus* Resident at the Airport
- Dryoscopus gambensis* Once in mangroves at Sangaria Bay (G), 17 Feb 1981.
- Lanius collaris* Surprisingly observed only once, near Kipé.
- Oriolus* sp. An oriole called regularly in mangroves at Sangaria Bay during Feb 1981.
- Lamprotornis chalybaeus* One near Airport 16 Nov 1980.
- Cinnyricinclus leucogaster* A pair once seen feeding in scrub near the Airport, 16 Mar 1980.
- Corvus albus* A few resident throughout the area.
- [*Picathartes gymnocephalus* A bird possibly of this species disturbed among rocks on Kakoulima Hill.]
- Campephaga phoenicea* A female in the Botanical Gardens, 15 Feb 1980. A completely black male on Kakoulima in Feb 1981 may have been this species or *C. quiscalina*.
- Pycnonotus barbatus* Common everywhere.
- Anropadus gracilirostris* One seen in primary forest on Kakoulima, Nov 1980.

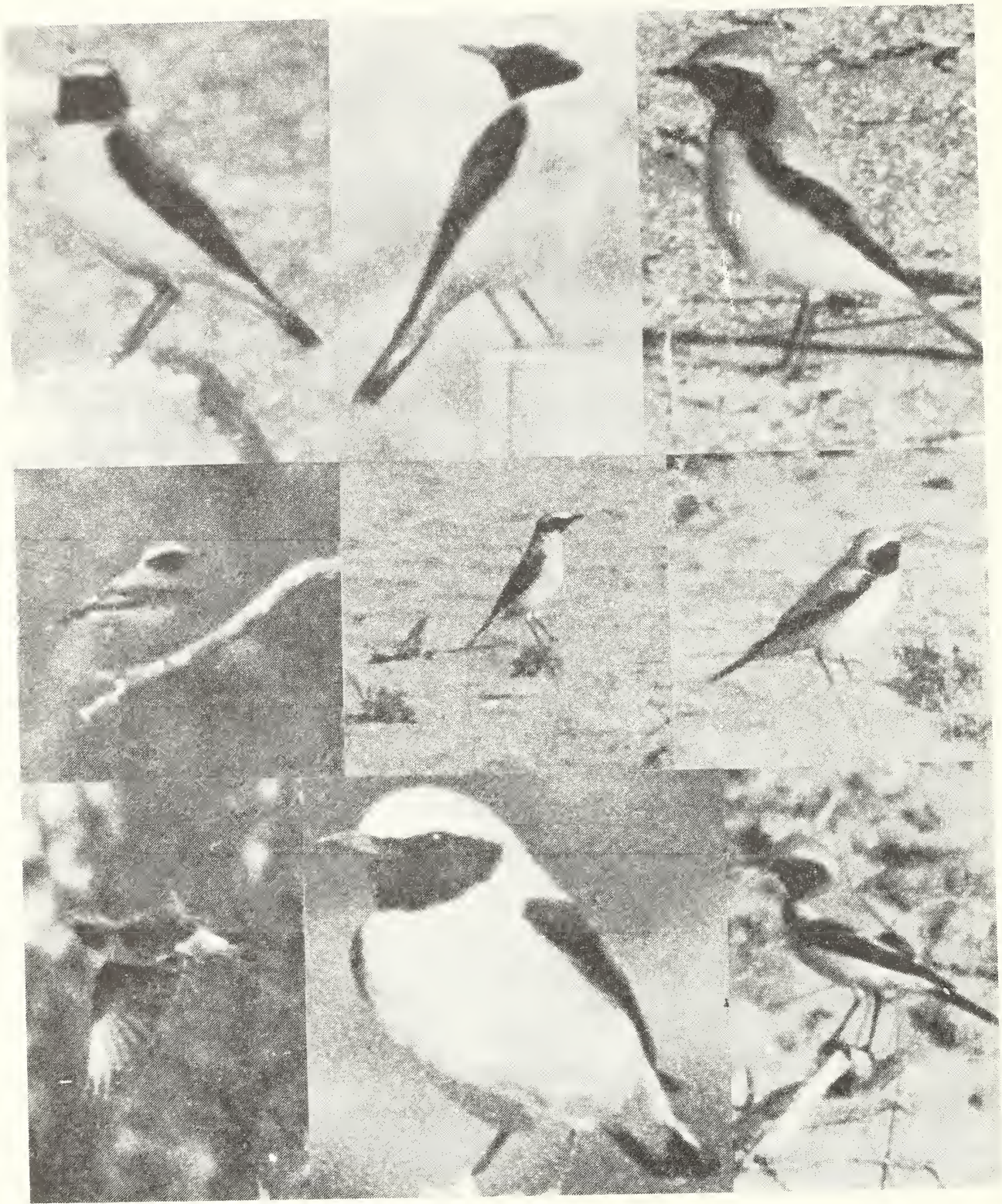
- Chlorocichla simplex* Occurs in thick undergrowth in the old Cemetery.
- Saxicola rubetra* Winter resident at the Airport, last date 18 Apr.
- Oenanthe oenanthe* One near Daboni, Nov 1980.
- Cossypha albicapilla* Pair resident in thickets in Daboni.
- Cossypha niveicapilla* Resident at old Cemetery, also in scrub adjacent to Airport Creek.
- Turdus pelios* Seen near Kipé, also on Kakoulima.
- Turdoides plebejus* Occurs in the old Cemetery and in scrub at the Airport Creek.
- Acrocephalus schoenobaenus* Common in mangroves at Airport Creek during Apr.
- Sylvia atricapilla* One seen feeding in a City garden, Jan 1982.
- Phylloscopus trochilus* Very common from early Feb to mid Apr, many in full song by the end of Mar.
- Cisticola cantans* Common in scrub at Airport near water; also present near Sangaria Bay (G).
- Cisticola galactotes* Occurs in scrub at Sangaria Bay.
- Cisticola juncidis* Common in dry scrub around the Airport.
- Prinia subflava* Quite common in areas of neglected cultivation all over the city.
- Hypergerus atriceps* One seen in coastal scrub near Sangaria Bay on 16 Mar 1980.
- Cameroptera brachyura* Common in the Botanical Gardens and the old Cemetery.
- Sylvietta brachyura* Seen occasionally in secondary growth at the Airport Creek.
- Macrosphenus concolor* One in the Botanical Gardens on 22 Feb 1980.
- Artomyias ussheri* Seen at Kakoulima on 9 Feb 1981.
- Melaenornis edolioides* Two seen in Nov near Fosside.
- Platysteira cyanea* Often seen in mangroves at Sangaria Bay (G).
- Terpsiphone rufiventer* Male seen in primary forest below the top of Kakoulima Hill.
- Terpsiphone viridis* Pair in overgrown cultivation on Kakoulima.

- Anthreptes gabonicus* Common in mangroves at Sangaria Bay and the Airport Creek, but also regularly seen feeding in palms, mangroves and other trees at Kipé.
- Nectarinia venusta* The commonest sunbird, found throughout; many birds are white-bellied.
- Nectarinia chloropygia* Quite common in the Botanical Gardens and the adjoining Cemetery.
- Nectarinia pulchella* Occasionally seen in the Airport area, in gardens and in mangroves at Sangaria Bay.
- Ploceus cucullatus* Very common in the Airport area and the outskirts of the city.
- Ploceus nigricollis* Present in numbers in the Botanical Gardens and Cemetery; nest-building in Mar.
- Euplectes ardens* Occurs in overgrown cultivation on lower slopes of Kakoulima, Nov 1980.
- Euplectes hordeaceus* Several displaying males in long grass and reeds at (I) and also at Airport Creek, Nov 1980.
- Euplectes macrourus* A few in overgrown cultivation on the lower slopes of Kakoulima, Nov 1980 and at the Airport Creek during the same period.
- Passer griseus* Fairly common near houses throughout the city.
- Vidua macroura* At least four males resident at the Airport.
- Estrilda melpoda* Group feeding in seeding grasses, Airport Creek, Nov 1980.
- Estrilda troglodytes* Large group feeding on seeding grasses, Airport Creek, Nov 1980.
- Estrilda astrild* Present in overgrown cultivation on the lower slopes of Kakoulima.
- Estrilda caerulescens* Several, possibly this species, disturbed in village of Kaporo, near (G).
- Lagonosticta senegala* Very common, found almost everywhere.
- Ortygospiza atricollis* Resident at the Airport in tall grass adjacent to irrigation ditches.
- Lonchura cucullata* Present wherever seeding grass available.

ACKNOWLEDGEMENTS

I wish to thank Dr G. Morel for his invaluable comments and correspondence during the preparation of this paper. I would also like to thank Graeme Backhurst for his advice and assistance in the preparation of this paper and Don Turner for helpful comments on identification of species, also H. Jacobs for assistance with field-work in Guinée.

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Wheatears in Mauritania. Left column *Oenanthe oenanthe seebohmi*; centre column *O. hispanica*; right column *O. deserti*. See p. 84. Photos P.W.P. Browne

POIDS DES DENDROCYGNES FAUVES *DENDROCYGNA BICOLOR* AU SENEGAL - En complément à une étude de régime alimentaire (en préparation), il nous a paru intéressant de donner quelques indications supplémentaires sur les populations de Dendrocygnes fauves (*Dendrocygna bicolor*) du delta du Sénégal. En effet, les renseignements sur les poids des canards sont rares dans la littérature et quasi inexistants en ce qui concerne les Dendrocygnes fauves. Au cours de notre étude sur les régimes alimentaires, nous avons examiné 138 Dendrocygnes fauves: 106 adultes (sans Bourse de Fabricius) et 32 immatures (avec Bourse de Fabricius). Nous ne retiendrons ici que les poids des canards adultes, puisque les immatures peuvent, au moment de leur capture, n'avoir pas atteint encore leur taille adulte.

Résultats bruts: Les poids variaient, parmi les 57 ♂ examinés, entre 640 et 1050 g, la moyenne étant de 819.4 g et l'écart type de 88.1 g. Pour les 49 ♀, les poids étaient compris entre 580 et 1030 g, avec une moyenne de 793.3 g et un écart type de 92.3 g.

Discussion: La légère différence de poids entre les ♂ et les ♀ n'est pas statistiquement significative (analyse de variance, $T = 1,488$). Par contre, les différences de poids selon les mois sont significatives (analyse de variance, $F_{10,95} = 1.99$), $P = 0.95$. Les Dendrocygnes fauves maigrissent en fin de saison sèche (Mai) quand ils ont du mal à trouver leur nourriture et grossissent le plus en novembre-décembre au moment de la récolte du riz (qui représente 1/3 de leur régime alimentaire sur l'année, cf. TRECA en préparation).

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RINGING IN NIGERIA IN 1981. 24th ANNUAL REPORT

Schedule 1 Numbers of Palaearctic species ringed

	<u>1980</u>	<u>Total to date</u>
Little Bittern <i>Ixobrychus minutus</i>	1	6
Ringed Plover <i>Charadrius hiaticula</i>	1	26
Black Tailed Godwit <i>Limosa limosa</i>	2	4
Wood Sandpiper <i>Tringa glareola</i>	1	572
Snipe <i>Gallinago gallinago</i>	1	78
Jack Snipe <i>G. minima</i>	1	31
Little Stint <i>Calidris minuta</i>	4	372
Wryneck <i>Jynx torquilla</i>	3	86
Sand Martin <i>Riparia riparia</i>	5	1505
Yellow Wagtail <i>Motacilla flava</i>	3	33813
Whinchat <i>Saxicola rubetra</i>	1	503
Redstart <i>Phoenicurus phoenicurus</i>	19	344
Nightingale <i>Luscinia megarhynchos</i>	2	499
Bluethroat <i>L. svecica</i>	1	5
Wheatear <i>Oenanthe oenanthe</i>	2	35
Savi's Warbler <i>Locustella luscinioides</i>	3	10
Sedge Warbler <i>Acrocephalus schoenobaenus</i>	125	2204

Reed Warbler <i>A. scirpaceus</i>	68	470
Great Reed Warbler <i>A. arundinaceus</i>	9	149
Icterine Warbler <i>Hippolais icterina</i>	5	203
Melodious Warbler <i>H. polyglotta</i>	2	157
Olivaceous Warbler <i>H. pallida</i>	8	220
Garden Warbler <i>Sylvia borin</i>	1	2399
Whitethroat <i>S. communis</i>	43	2133
Lesser Whitethroat <i>S. curruca</i>	3	191
Subalpine Warbler <i>S. cantillans</i>	8	246
Willow Warbler <i>Phylloscopus trochilus</i>	3	990
Total	324	56428
Ethiopian birds	35	15768
Grand Total	359	72196

Schedule 2 Controls in Nigeria

White Stork *Ciconia ciconia*

See Fry, 1982, *Malimbus* 4: 47. Thanks are due to John Hughes for obtaining six White Stork rings from a village near Nguru. It indicates that stork catching is still carried out in Kano State only a few miles from Bornu State, where the law is more rigorously enforced and stork trappers are prosecuted.

Osprey *Pandion haliaetus*

M16516 Ringed 19/7/80, Rantasalmi Laani, Finland, 62° N 28°39'E
Trapped 31/1/81, Nguru

Schedule 3 Controls in Ghana

Swallow *Hirundo rustica*

P42649 Ringed 8/8/77, Talavera la Real, Spain, 38°53'N 6°46'W
Trapped and reringed London AO27013
25/1/78, Tafo-Akim, 6°13'N 00°22'W

Black Kite *Milvus migrans*

MD12641 Ringed 25/6/77, Nava del Rey, Spain, 41°19'N 5°05'W
Shot 15/1/79, Tamale, 9°26'N 00°49'W

DEO8949 Ringed 14/6/72, Coto Donana, Spain, 37°02'N 03°27'W
Caught -/11/73, Kpandu, 07°00'N 00°25'E

MD14782 Ringed 22/6/77, Pescueza, Spain, 39°54'N 06°39'W
Hit car 7/12/77, Yape, 10°44'N 00°53'W

ADDITIONS TO LOCAL AVIFAUNAS: KANO STATE - The following species new to Kano State, Nigeria, are additional to those reported by Sharland & Wilkinson (*Malimbus* 3, 1981: 7-30). Observers: RW R. Wilkinson, DJA D.J. Aidley, RES R.E. Sharland, RB R. Beecroft. For details of localities see Sharland & Wilkinson (*loc. cit.*).

African Hawk-Eagle *Hieraaetus spilogaster* Two records from Falgore, on 10 January and 29 April 1982 (RW, DJA).

Black-necked Grebe *Podiceps nigricollis* Reported from Jekara Dam by C.H. Fry (*Malimbus* 3, 1981: 54).

Palm-nut Vulture *Gypohierax angolensis* One at Falgore on 5 January 1982 (RB).

Little Crake *Porzana parva* Recorded from Jekara Dam (RW, RB, DJA); details in *Bull. Brit. Orn. Cl.* (in press).

Red-chested Cuckoo *Cuculus solitarius* One at Falgore on 9 August 1982 (RW).

Plain Nightjar *Caprimulgus inornatus* A sight record by RES (*Bull. Niger. Orn. Soc.* 1, 4, 1964: 77-80) now substantiated by two birds netted at Kano in May 1981 (DJA).

Palm Swift *Cypsiurus parvus* Omitted by Sharland & Wilkinson (*op. cit.*) in error. The Palm Swift is a common resident throughout Kano State.

Pallid Swift *Apus pallidus* A single bird flying with Little Swifts *Apus affinus* and Sand Martins *Riparia riparia* over Jekara Dam on 18 April 1982 (RW).

Cardinal Woodpecker *Dendropicos fuscescens* One at Falgore on 8 January 1982 (RW).

European Swallow *Hirundo rustica* Omitted by Sharland & Wilkinson (*op. cit.*) in error. A regular passage migrant through Kano in April and September.

Black-cap Bush Shrike *Tchagra minuta* A pair by river at Falgore on 6 February 1982, and single birds at the same locality on 11 March and 25 July 1982 (RW).

White-breasted Cuckoo-Shrike *Coracina pectoralis* Recorded only from Falgore: a pair on 25 March and one on 9 August 1982 (RW).

Black-cap Babbler *Turdoides reinwardii* First unambiguously identified at Falgore on 6 February 1982, and encountered again in March and April. A previous observation at Falgore in November 1981 is now believed to be of this species (RW, DJA).

Winding Cisticola *Cisticola galactotes* Mist-netted in reed-beds at Jekara Dam in November 1981 and again in January, May, June, July and August 1982 (RW, DJA).

Swamp Warbler *Acrocephalus gracilirostris* Netted at Jekara in May 1981 (DJA) and repeatedly from November 1981 until August 1982.

African Reed Warbler *Acrocephalus boeticatus* Another new species from Jekara Dam, netted every month from November 1981 to June 1982 (DJA, RW).

Grey-headed Olive-back *Nesocharis capistrata* First seen at riverside locality in Falgore on 6 February 1982 and netted there on 11 March 1982 (RW, DJA).

Parasitic Weaver *Anomalospiza imberbis* A single male netted in reedbeds at Jekara Dam on 26 May 1982 (RW, DJA). This may be the most northerly record for this species in Nigeria.

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Ceyx picta, cont. from p. 54

The evidence available to Elgood et al. in 1973 was insufficient to show that *C. picta* is migrant. With more information on seasonal occurrence of birds at different localities it would not be surprising to find that other species, presently considered to be sedentary, may undertake regular seasonal movements too.

REFERENCES (See also Table 1)

- BENSON, C.W. (1982) Migrants in the Afrotropical region south of the equator. *Ostrich* 53: 31-49
ELGOOD, J.H. (1982) The Birds of Nigeria. B.O.U. Checklist No. 4
ELGOOD, J.H., FRY, C.H. & DOWSETT, R.J. (1973) African migrants in Nigeria. *Ibis* 115: 1-45, 375-411
MOREL, G. (1968) Contribution a la synécologie des oiseaux du sahel sénégalais. *Mem. O.R.S.T.O.M.* 29: 179 pp.

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CORRECTION

Birds of Obudu, *Malimbus* 2 (1980) p 20: for *Ploceus ocularis* read *Ploceus nigricollis*. A.E. Heaton.

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REFERENCES A OMETTRE DANS LA BIBLIOGRAPHIE

- BANNERMAN 1930-51 or 1953 : Bannerman, D.A. (1930-51) *The Birds of West Tropical Africa*. 8 vols. Crown Agents, London; ----- (1953) *The Birds of West and Equatorial Africa*. 2 vols. Oliver and Boyd, Edinburgh and London
- ELGOOD 1982 : Elgood, J.H. (1982) *The Birds of Nigeria*. B.O.U., London
- ELGOOD, SHARLAND & WARD 1966 : Elgood, J.H., Sharland, R.E. & Ward, P. (1966) Palaearctic migrants in Nigeria. *Ibis* 108 : 84-116
- ELGOOD, FRY & DOWSETT 1973 : Elgood, J.H., Fry, C.H. & Dowsett, R.J. African migrants in Nigeria. *Ibis* 115 : 1-45 and 375-411
- HALL & MOREAU 1970 : Hall, B.P. & Moreau, R.E. (1970) *An Atlas of Speciation in African Passerine Birds*. British Museum (Nat. Hist.), London
- MACKWORTH-PRAED & GRANT 1957-73 or 1970-73 : Mackworth-Praed, C.W. & Grant, C.H.B. (1957-73) *African Handbook of Birds*. Series I, Birds of Eastern and North Eastern Africa (2nd ed.). 2 vols. Series II, Birds of the Southern Third Africa. 2 vols. Series III, Birds of West Central and Western Africa. 2 vols. Longmans Green & Co., London; ----- (1970-73) *African Handbook of Birds*. Series III, Birds of West Central and Western Africa. Vol. I, 1970, Non-passerines, Vol. 2, 1973, Passerines. Longmans, London
- SERLE & MOREL 1977 : Serle, W. & Morel, G.J. (1977) *A Field Guide to the Birds of West Africa*. Collins, London
- SNOW, D.W. (Ed.) 1978 : *An Atlas of Speciation in African Non-Passerine Birds*. British Museum (Nat. Hist.), London
- WHITE 1960-65 : White, C.M.N. (1960) A check list of the Ethiopian Muscicapidae (Sylviinae) Part I Occasional papers of the National Museums of Southern Rhodesia 3 (24B) : 399-430; (1961) A revised check list of African broadbills ... etc. Lusaka : Government Printer; (1962a) A check list of the Ethiopian Muscicapidae (Sylviinae) Parts II and III. Occ. Pap. Nat. Mus. S. Rhod. 3 (26B) : 653-738; (1962b) A revised check list of African shrikes ... etc. Lusaka : Gov. Printer; (1963) A revised check list of African flycatchers ... etc. Lusaka : Gov. Printer; and (1965) A revised check list of African Non-Passerine birds. Lusaka : Gov. Printer.

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